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Skill Level, Self-Views and Self-Theories as Sources of Error in Self-Assessment

Joyce Ehrlinger*
Florida State University

Abstract

People's impressions of the quality of their performances are often surprisingly inaccurate. In this paper, I discuss three specific factors that contribute to error in self-assessment. First, at a most basic level, individuals must possess a certain level of knowledge to simply distinguish weak from strong performances. Thus, a lack of skill can contribute to erroneous self-assessments. Second, even those who possess skill might rely on the wrong information to evaluate their performances. I discuss how relying on preexisting self-views can lead estimates of one's performance astray. Third, I discuss how motivational forces can play an indirect role in overconfidence. In particular, theories of intelligence that inspire people to think well of themselves also inspire behaviors that contribute to overconfident impressions of how well one has performed on a task. Finally, I discuss how we can draw on this research to improve accuracy in self-assessments.

A common challenge faced by teachers is finding a way to help those students who are shocked by their poor performances on examinations. These same students often insist that they studied furiously and knew all of the material going into the test. The confidence that these students feel going into the examination, it seems, has little connection to their actual level of understanding and, consequently, their eventual performance on course examinations. At the same time, many other students hand in their examinations hesitantly, with heads hung low, only to learn later that they have performed quite well. Students' self-assessments, it seems, often have little connection to their actual performance.

Knowing oneself well is an important goal. Making wise choices – be they about how to best prepare for an examination or important life choices such as which career to pursue – seems to require an accurate assessment of one's strengths and weaknesses, of what one does well and where one needs improvement. A wealth of research, however, suggests that people are often quite poor at evaluating themselves across a variety of domains (for reviews, see Dunning, 2005; Dunning, Heath, & Suls, 2004; Falchikov & Boud, 1989; Harris & Schaubroeck, 1988; Mabe & West, 1982). Self-assessments are often in error despite the wealth of

feedback that each of us receives within our everyday life. For example, Borkenau and Liebler (1993) have shown that an individual's self-evaluation of intelligence are less accurate than evaluations made by strangers who have viewed only a 90-second videotape of the individual reading a weather report. Surely it is not the case that people have no self-insight. The exact relationship between estimated and actual performance varies across domains but, on average, is weak (the average correlation is 0.3, Mabe & West, 1982).

Is Accuracy an Important Goal?

One might ask whether it is really important to make accurate self-assessments. Indeed, past research shows considerable benefits of at least some types of optimism. Individuals who are particularly confident often persist longer at tasks (Bouffard-Bouchard, Parent, & Larivee, 1991; Jacobs, Prentice-Dunn, & Rogers, 1984), leading to better performance (Cervone & Peake, 1986; Kane, Marks, Zaccaro, & Blair, 1996; Wood, Bandura, & Bailey, 1990). Those optimistic about their health take better care of themselves (Schwarzer, 1999; Taylor et al., 1992) leading to better health outcomes (Peterson, 1988; Segerstrom, Taylor, Kemeny, & Fahey, 1988). Certainly there are some benefits to being confident but there are also important costs.

First, research on the benefits of inaccurate self-insight largely focuses on one type of inaccuracy – overconfidence. Although overconfidence is remarkably prevalent (e.g., Alicke, 1985; Brown, 1986; Dunning, Meyerowitz, & Holzberg, 1989; Weinstein, 1980), some of the mechanisms that produce overconfidence can also lead to underconfidence (e.g., Ehrlinger & Dunning, 2003; Kruger, 1999). If overconfidence leads to greater persistence and performance, self-assessment errors in the other direction are likely to lead to demonstrably worse outcomes.

Second, even when focusing on overconfidence, people tend to make inaccurate evaluations of their abilities and performances in ways that can have important implications for the self. For example, employees evaluate the quality of their job performance and their likelihood of promotion in ways that do not correlate well with the evaluations of their peers or, more importantly, their supervisors (Harris & Schaurbroeck, 1988). Similarly, people tend to be overconfident in assessing their likelihood of developing health problems (Strecher, Kreuter, & Kobrin, 1995; Weinstein, 1980), a tendency that could make them less likely to engage in preventative measures.

Perhaps even more important, error in self-assessments can have important implications for those around us. For example, lawyers tend to be overconfident when assessing the likelihood of winning a case they are about to try (Loftus & Wagenaar, 1988). Certainly this failure can have important consequences for their clients who, perhaps, might be better

served by striking a deal or finding a more able lawyer. Similarly, doctors (Tracey, Arroll, Richmond, & Barham, 1997), nurses (Marteau, Johnston, Wynne, & Evans, 1989), and laboratory technicians (Haun, Zeringue, Leach, & Foley, 2000) all tend to have little insight into how well they have performed on tests of their relevant skills. This failure of self-insight is particularly troubling given the degree to which we trust these professionals. Thus, there is no simple answer to the question of whether accurate self-assessments are, on the whole, good or bad. There are, however, certainly cases in which accurate self-insight is an important goal.

Sources of Error in Self-Assessment

Demonstrations of poor self-insight have sparked empirical efforts to understand the sources of error in self-assessments. As with many robust phenomena, it seems that error in self-assessments is multiply determined. Intuition might suggest that overconfidence, in particular, is a motivated phenomenon. People might believe that they are quite talented in many domains because it feels good to hold this belief. Indeed, there is considerable empirical support that people, for example, more readily accept evidence suggesting that they possess positive traits than they do evidence to the contrary (e.g., Baumeister & Newman, 1994; Kunda, 1990). Furthermore, individuals tend to define traits in self-serving ways, to match whatever qualities they may already possess (Dunning et al., 1989). Not surprisingly, then, the degree to which self-assessments are accurate depends, in part, on the degree to which the dimension of interest can be defined in multiple ways (Hayes & Dunning, 1997). Much of the research on self-insight, then, has centered on where the greatest errors lie – in judgments of the degree to which people possess particular traits and abilities in general.

This is not to say, however, that people are accurate when assessing themselves on more specific dimensions. Much of the research I will discuss in this paper asks participants to evaluate how well they have performed on a specific task, just after completion. In so doing, this research allows us to explore additional sources of error. Furthermore, the clear standards for success on these tasks (e.g., choosing the correct answer to a multiple-choice question) allow researchers to identify which specific individuals are overconfident and underconfident. Armed with this knowledge, researchers have been able to identify factors that predict the degree of accuracy.

I will discuss three specific factors that contribute to error in self-assessments of performance on tasks. In particular, I will discuss how assessments of one's performances can be led astray by (i) a lack of skill in the relevant domain, (ii) a tendency to rely too much on chronic self-views to evaluate performances, and (iii) a tendency to allocate one's attention in motivated ways – paying greater attention to those things that allow

one to believe they are performing well while ignoring evidence to the contrary.

How Level of Skill Contributes to Error in Self-Assessments

In order to know whether one is performing well, one has to know what a good performance looks like. This can be quite easy for physical tasks. To compare one's swimming performance to that of another, one need merely compare times for swimming a particular distance. Evaluating one's intellectual performances, however, is quite a bit more difficult. It is easy to identify when you possess absolutely no skill. I know upon looking at a Sanskrit text that I would not know how to begin to translate it. Once individuals gain even a small amount of skill, however, it becomes difficult for them to evaluate their level of skill. Take, for example, the case of a multiple-choice test. For a person to know whether she has answered each test question correctly, she must know which is the correct answer. By definition, those who lack skill do not know the correct answer and, as such, lack the knowledge necessary to realize that they have not performed well. Indeed, those who lack skill have greater difficulty than their more skilled counterparts in distinguishing between correct and incorrect responses, whether those responses are their own or are provided by another individual (e.g., Kruger & Dunning, 1999; Sinkavich, 1995).

By this logic, one source of error in self-assessments is a lack of skill in the relevant domain. As one might expect, then, those who perform the worst on intellectual tasks also tend to make the least accurate estimates of how well they have performed (Dunning, Johnson, Ehrlinger, & Kruger, 2003; Kruger & Dunning, 1999). For example, Kruger & Dunning asked students to estimate how well they had performed immediately following a course examination. On average, the students made overconfident estimates of their performance but the degree of this error depended heavily on their level of skill (as measured by their actual examination performance). Those who scored in the top quartile tended not to be overconfident. If anything, these individuals were overly modest about their score, estimating that their performance fell in the 79th percentile when it actually fell in the 90th percentile. Those who performed the worst on this examination, however, were dramatically overconfident. Those who, on average, scored in the 13th percentile estimated that their performance was in the 55th percentile.

While we argue that overestimation on the part of poor performers stems from an inability to recognize their poor performance, it is worth discussing other possible interpretations of this overestimation. In particular, critics have argued that overconfident estimates made by poor performers stem largely from regression to the mean (Krueger & Mueller, 2002; see also Ackerman, Beier, & Bowen, 2002; Krueger & Funder, 2004). Poor performers are defined by single extreme performances but their average

scores across multiple tasks might be higher and more in line with their estimates. If true, one might argue that the lack of skill does not leave people unable to accurately evaluate their performance. Instead, the error in their self-assessments can be attributed to statistical error combined, perhaps, with the simple motivation to think well of the self. Recent evidence, however, suggests that this is not the case. In two studies, my colleagues and I used multiple observations of performance to determine the level of reliability in our tasks. In particular, we examined students' assessments of a course examination performance while also measuring their performance on a second examination. In a separate study, we collected data from three separate judges on students' debate performances. Using multiple measures of participants' performance, we were able to control for the degree of reliability in the task and separate the effect of this unreliability on accuracy in estimates from other sources of error. Even after controlling for the lack of reliability that might contribute apparent overconfidence, those who are least skilled provide dramatically overconfident estimates of their performance.

Furthermore, overconfidence on the part of the unskilled does not seem to stem from a simple desire to think well of the self. In one study, my colleagues and I approached gun owners who were taking part in a trap and skeet competition and asked them to take a short test of gun safety and knowledge designed by the National Rifle Association (Ehrlinger, Johnson, Banner, Dunning, & Kruger, forthcoming). This test included general knowledge questions about guns (e.g., what is the difference between blank and dummy bullets) as well as questions about how to use guns safely (e.g., how do you safely unload a gun and what do you do when a cartridge fails to fire immediately). After completing the test, we asked them to estimate how many of the 10 questions they had answered correctly and how well their own performance would compare to that of others taking the test that day. Half of these participants were also told that we wanted for them to be as accurate as possible in their estimates and would pay them $5 if they were able to estimate within 5% of their actual score. On average, participants were overconfident in their performance on the test but, in particular, those individuals who demonstrated the least understanding of gun safety were just as confident as the top scorers. Thus, we replicated the pattern of overestimation observed by Kruger and Dunning (1999). Moreover, those offered an incentive to be accurate were just as overconfident as their peers that were offered no incentive, suggesting that poor performers simply were not able to recognize how poorly they had performed. It is important to note that these were not individuals who had just picked up a gun for the first time. Instead, they had owned firearms for an average of 34.5 years and, that day, were planning on participating in a shooting competition. Still, those who performed the worst, who you would least want to use their firearm, failed to recognize their deficits even when provided an incentive to be accurate.

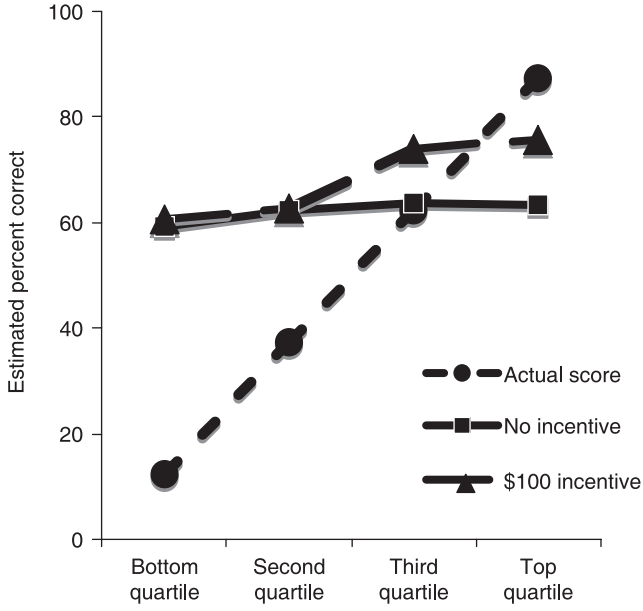

Figure 1 Actual versus estimated performance among control participants and those offered $100 to be accurate, split by level of actual performance.

One might wonder whether $5 is a sufficient incentive to convince those planning to use their gun that day to tell us that, in fact, they knew little of about their guns and how to use them safely. Thus, in a second study, we capitalized on the fact that college students are typically always in need of money. We asked a group of college students to take a test of logic and evaluate how well they had performed. As with our trap and skeet shooters, we offered half of the students an incentive if they could accurately evaluate their performance. In this case, however, we told students that we would give them $100 if they could tell us exactly how many of the 20 questions they answered correctly. They were also told that they could win $25 if their estimate was within one question of their true score. The experimenter held a stack of $100 bills during the experiment, making salient the possibility to walk away $100 richer. Participants seemed quite motivated to win this prize. Even in the face of this strong incentive, however, students were not any more accurate in estimating their score. Figure 1 shows both the large difference between the actual and estimated performance of poor performers and the estimates offered by those with a strong incentive to be accurate. No one took home the $100 prize and only a handful of students won $25. In particular, those students who performed the worst on this test did not seem to be overestimating their performance just to feel better or present themselves in a favorable light. Although $100 is very strong incentive for college

students to set aside their pride and try to be more accurate, these students were just as overconfident as their peers who were not offered an incentive to be accurate.

In summary, those who lack skill also lack the knowledge to recognize when they are performing poorly. Even in the face of strong incentives to be accurate, these poorly skilled individuals lacked the relevant knowledge to accurately assess how well they performed. A lack of skill, however, is far from the only factor that leads to error in self-assessments. Although the poor performers displayed the greatest amount of overconfidence, they were not the only participants to provide inaccurate estimates. What are some of the factors that contribute to even inaccuracy even among more skilled individuals?

How Preexisting Self-Views Contribute to Error in Self-Assessments

Even when individuals are able to distinguish between strong and weak performances, they might rely on faulty or untrustworthy information when evaluating the quality of their performances. One possible strategy a person might use to determine how well she has performed on any specific test is to draw on her preexisting perception of how skilled she is in that particular domain. For example, a doctor might evaluate the accuracy of a suspected diagnosis by drawing on her general perception of how knowledgeable she is about diseases and symptoms of that kind or even how skilled she is as a doctor in general. This would be a great strategy for evaluating the quality of a performance if these self-views were based on an accurate accounting of past experiences reflecting what one has learned and how and when one has succeeded versus failed. Indeed, psychologists lament that people draw on base-rate information of this sort all too infrequently (Bar-Hillel, 1980; Kahneman & Tversky, 1973).

Unfortunately, people's self-assessments are often remarkably stable even in the face of contradictory feedback (Arnold, Willoughby, & Calkins, 1985; Hacker, Bol, Horgan, & Rakow, 2000). Furthermore, people's preexisting beliefs regarding their knowledge and ability levels are often influenced by factors that are not at all predictive of how well they will perform on specific tasks. Note, for example, the consistency with which participants estimate their performance around the 60th percentile in Figure 1. Certainly this perception is not tied to their actual performance. It might, instead, stem from drawing on shared views of the difficulty of logic tasks and a shared desire to believe one's performance above average. A wealth of research has demonstrated that self-views are, in part, a reflection of cultural beliefs and of wishful thinking (for review, see Dunning, 2005). For example, women hold less positive beliefs of their ability to understand scientific concepts than do men even in samples that show no difference in performance on tests of this ability (Ehrlinger &

Dunning, 2003). Even basic guidelines for what determines expertise can sometimes be misleading. For example, greater levels of experience are typically thought to be correlated with greater levels of skill. Thus, a doctor might be confident in a diagnosis because he knows that he has been in practice for many years and managed to kill relatively few patients. In some cases, this confidence might be justified but in other cases not. For example, research has shown that once they finish their training, mammographers perform worse the more years of experience they have (Beam, Conant, & Sickles, 2003). Those mammographers finishing school are very well practiced and informed by the most current research, leaving them better able to perform their job than those who are further removed from this training.

As such, self-views can introduce error in judgments of performance. To the degree that people base estimates on self-views that are inaccurate, ignoring cues within the situation that might lead to better estimates, they are likely to be in error. David Dunning and I conducted several studies exploring the degree to which people relied on self-views in a way that introduced error into their self judgments (Ehrlinger & Dunning, 2003).

Our first study capitalized on the fact that many tasks can be described in multiple ways, including some that might inspire confidence and some that might inspire insecurity. Tests of logic, for example, can be considered tests of logical ability, the ability to reason abstractly, intelligence, and also the ability to perform well on the myriad tasks that require logical or abstract thinking and intelligence. Thus, we asked a group of psychology students to complete a short test that was labeled either as a test of their ability to reason abstractly (about which psychology students tend to be confident) or a test of their ability to learn to program a computer (an ability that few psychology students believe they possess). As expected, participants were far more confident in their ability to reason abstractly than they were in their ability to learn to program a computer and this difference in confidence carried over to their self-assessments on our test. Trusting in their abstract reasoning ability, participants judged accurately that they had performed well on a test purported to measure that ability. Participants scoring equally well on the very same test, however, were less confident when they believed the test measured their ability to program a computer, an ability about which they were far less confident. Furthermore, this relationship between the test label and error in performance estimates was mediated by participants' perceptions of their abstract reasoning and computer programming abilities. Thus, it seems that participant-based assessments of their test performance, in part, upon whichever self-view seemed relevant to the task (as predicted by test label) and doing so predicted error in those self-assessments.

In a separate study, manipulating self-views produced parallel effects on self-judgments. We asked participants to complete a brief background survey consisting of 12 questions designed to leave them particularly

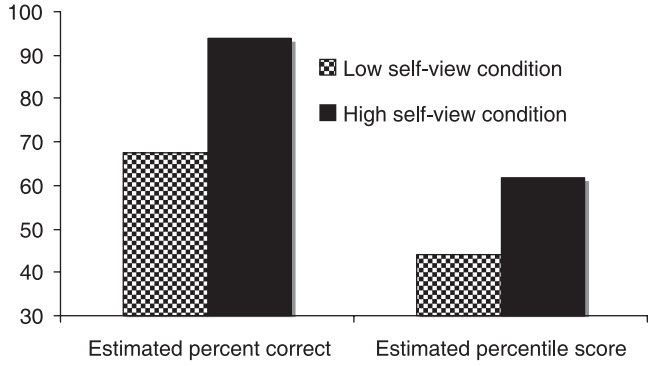

Figure 2 Self-assessments on a city placing task by those lead to hold relatively low versus high perceptions of their geography knowledge.

confident or unconfident in their knowledge of geography. For example, participants were asked how many state capitals they could name. In the 'high self-view' condition, participants were given the options of 1–2 state capitals, 3–4, or 5 or more. We predicted that most participants would select the highest option (5 or more) leaving them more confident in their knowledge of geography than participants in another condition, who were asked to select between 1–10 state capitals, 11–30, and 31 or more. Participants assigned to this second 'low self-view' condition, we predicted, would be forced to select one of the lowest options and be left with less confidence in their knowledge of geography. Indeed, those randomly assigned to the 'low self-view' condition gave less positive ratings of their knowledge of US geography than did those assigned to the 'high self-view' condition. Next, we asked participants to mark the location of 15 cities on a blank map of the USA. We explained that a mark within 50 miles of the city's true location would count as correct and further away would count as incorrect. As shown in Figure 2, participants in the 'low self-view' condition made less confident assessments of their performance on the city placing task than did those in the 'high self-view' condition. Furthermore, this effect of condition on estimates of performance was mediated by differences in their perceived geographical knowledge. Thus, participants seemed to rely on their knowledge of geography to determine how well they performed on our city mapping task and this reliance predicted error in their self-assessments.

The importance of this work is most clear when applied to an enduring issue in the real world – the gender gap in the pursuit of scientific and mathematical careers. Women routinely hold less confidence in their level of scientific skill than do men and this difference is reflected in the laboratory when asked to evaluate their performance on scientific tasks. We have shown that women's general lack of confidence in their scientific ability leads to a lack of confidence on specific scientific tasks that, in turn,

leads to less interest in future scientific pursuits, relative to men (Ehrlinger & Dunning, 2003). This pattern of data suggests that women might disproportionately avoid scientific pursuits in part because a lack of confidence in their scientific abilities leads them to mischaracterize how well they are doing on any given scientific task.

Although it seems reasonable to rely on self-views to determine how well one has performed, this practice introduces considerable error into self-assessments. As such, people might be better served by relying less on preexisting self-views when evaluating the quality of their performances and more on factors specific to those particular performances.

Do Motivational Sources of Error Work in an Indirect Manner?

Thus far, I have painted a relatively cognitive picture of the sources of error in self-assessment – as stemming from ways in which a lack of competence limits the amount of relevant information available and ways in which people rely too much on self-views, given that self-views are not always very accurate. Indeed, I have described evidence that overconfidence does not stem from simply choosing to hold overly positive views of your performance. If it did, our college students would have been able to offer more accurate estimates of their performance when doing so would win them a $100 prize (Ehrlinger et al., forthcoming).

But that is not to say that perceptions of performance are uninfluenced by what people would like to believe. Indeed, some of the most interesting sources of error in self-assessment might stem from interactions between motivation and cognition. Thus, in my most recent work, I have focused on identifying how motivation introduce error in self-assessments indirectly, by driving cognition and behavior in ways that influence accuracy in self-assessments.

One reason that individuals so often seem to lack accurate self knowledge might be that knowing oneself well is not necessarily an individual's primary goal. Whereas some individuals may highly value objective feedback because of its greater utility for learning, others might value maintaining a positive view of the self, even if that view is not accurate. The degree to which self-knowledge is accurate likely depends on which goal is most prominent. Goals to preserve positive views of the self, in particular, are likely to inspire a series of behaviors that promote overconfidence in self-judgments.

How a Fixed Theory of Intelligence Can Introduce Error in Self-Assessments

Carol Dweck and I have recently proposed that a greater understanding of the sources of inaccurate self-assessment can be gained through

attention to people's beliefs regarding the modifiability of intelligence (Ehrlinger & Dweck, 2007). People naturally differ in the extent to which they believe central features of the self are malleable (for review, see Dweck, 1999). Some individuals hold an incremental theory of intelligence, one characterized by the belief that a person's intelligence is malleable and able to be developed over time, while others hold an entity theory, one characterized by the belief that a person's intelligence is unchangeable. The theory one holds has substantial impact on the goals one pursues (Dweck & Leggett, 1988).

While there exists a general tendency to rely on self-views of abilities when estimating performance (Ehrlinger & Dunning, 2003), there are likely to be strong differences between entity and incremental theorists in the accuracy of those self-views and the degree to which they rely on them to evaluate performances. Because incremental theorists believe intelligence is acquirable, they are motivated to learn and improve their own intelligence (Dweck & Leggett, 1998). This orientation toward learning should make them more open to information about where they have failed, which should result in less overly positive, more accurate views of their current skill level and the quality of their performances. In contrast, entity theorists, believing that their intelligence cannot be improved, are likely to be more motivated to maintain a positive view of their fixed intelligence and to avoid feedback that might be inconsistent with that self-view.

Indeed, a host of evidence suggests that entity theorists, compared to incremental theorists, tend to see negative feedback as more threatening because they believe that this feedback speaks to their underlying ability level (e.g., Hong, Chiu, Dweck, Lin, & Wan, 1999; Dweck & Sorich, 1999). Furthermore, entity theorists rob themselves of information from which to gain self-insight by avoiding situations that might lead to negative feedback. Whereas incremental theorists are more often drawn to challenging tasks that could result in failure, but also present an opportunity for learning, entity theorists tend to prefer tasks that allow them to appear smart, demonstrating abilities they already possess rather than seeking new knowledge and risking negative feedback (Dweck & Leggett, 1988; Hong et al., 1999).

We explored self-assessments among entity and incremental theorists by asking them to take a short test made up of Graduate Record Examination antonym problems and then estimating how well they had performed (Ehrlinger & Dweck, 2007). As predicted, incremental theorists were far more accurate than were entity theorists both in their estimates of their test score and of their performance relative to their peers. But how did this difference emerge?

Aside from wishing to think well of their abilities, entity theorists have been found to preferentially attend to information that *confirms* preexisting impressions of other individuals while incremental theorists pay more

attention to information that is *inconsistent* with those impressions (Plaks, Stroessner, Dweck, & Sherman, 2001). Indeed, entity theorists incorporated inconsistent information into their impressions only when there was an overwhelming amount of it. Incremental theorists revised their impressions in a way closely connected to the proportion of expectation-inconsistent information provided.

We proposed that this same pattern would apply to information about the self, such that those possessing an entity theory regarding intelligence will pay more attention to information consistent with a self-view and less attention to information that is inconsistent than will incremental theorists. At the level of a single task, we expected entity theorists to pay greater attention to aspects of a task that suggest they are succeeding and less attention to task aspects that suggest failure. This biased pattern of attention allocation should leave entity theorists with better memory for successful than unsuccessful aspects of a task and, consequently, overconfident judgments about their performance. In contrast, we expected incremental theorists to be less threatened by aspects of a task that suggest they are not doing well. As such, we expected them to pay attention to both easy and difficult aspects of tasks, leaving them with a less-biased memory of the task and a more accurate impression of the quality of their performance.

To test these predictions, we asked incremental and entity theorists to take a short test made up of five particularly easy and five particularly difficult antonym problems. We then measured the amount of time it took for entity and incremental theorists to complete these two types of problems. We predicted that entity theorists would take just a little longer than incremental theorists on the easy problems, basking in the experience of success they provide. In contrast, we expected entity theorists to spend less time than incremental theorists on difficult problems because they would be uncomfortable with the experience of difficulty. Indeed, theories of intelligence did predict the way people allocated their attention, as measured by time spent on different task aspects. Incremental theorists, motivated by a goal to learn, allocated attention to hard *and* easy aspects of the task. As a result, they made relatively accurate judgments about the quality of their performance. Entity theorists, in contrast, focused primarily on easy aspects of the task, giving less attention to difficult aspects. As a result, they made overconfident judgments of their performance.

In a third study, we sought to more directly explore the role of focusing on difficult and easy problems on confidence for incremental and entity theorists. After completing a short trivia test made up of easy and difficult problems, we asked participants to go back through those problems and perform a short task for each. In one condition, we directed participants to focus on the easy problems by asking them to recopy the text of those problems, being careful to copy them exactly and to proofread their work to ensure that they have done so perfectly. These individuals were also

asked to look back at difficult problems but only for the time necessary to tell us the color of the text. Participants assigned to the 'focus on hard' condition were less lucky. We asked them to carefully recopy the text of the difficult trivia problems. While they also reviewed the easy problems, we asked to simply tell us the text color and then move on to the next task. This manipulation resulted in a drop in entity theorists' confidence and judgments of performance, which were now as accurate as those offered by their incremental theorist peers.

While the above studies are illustrative, they also represent only correlational evidence of a relationship between theories of intelligence and confidence. To explore the causal role played by theories of intelligence, we assigned participants to read one of two articles designed to manipulate their beliefs regarding the modifiability of intelligence. The entity article argued that 'the environment plays an important role only during the first three years of life, after which – barring brain damage – it seems to have almost no influence on intelligence whatsoever'. It backed this statement up with (fictional) examples of both anecdotal and experimental evidence. Other participants read an incremental article that argued 'intelligence has a minimal genetic component. Although people may be born with a given level of intelligence, our findings show that they can increase their IQ by up to 50 points'. This article also included fictional examples of anecdotal and experimental evidence to convince participants that intelligence is, indeed, changeable. Participants then took a short test and estimated how well they performed.

Just as in the previous studies involving those who came into the laboratory holding an incremental or an entity belief, participants convinced of the incremental and entity view showed reliable differences in how they allocated their attention and in levels of confidence in their test performance. Teaching individuals the view that intelligence is fixed led them to allocate their attention in biased ways, spending longer periods of time reviewing easy problems and less time on more difficult problems than their entity counterparts. As a result, these individuals offered overconfident estimates of their test performance. In contrast, teaching individuals the view that intelligence is a changeable trait, led them to allocate their attention to both easy and difficult aspects of a task and, consequently, to make relatively accurate evaluations of the quality of their test performance.

Thus, it seems that a belief that intelligence is fixed leads individuals to allocate their attention to aspects of a task that inspired overconfidence in their task performance. Across a variety of tasks those who come to the laboratory believing that intelligence is fixed, or who read our article meant to convince them of this view, show considerably more overconfidence than those with the view that intelligence is changeable. Because these individuals are more motivated than their incremental counterparts to believe that they are performing well, they allocated their attention in

ways that allowed them to maintain this belief. Those with a view that intelligence can be acquired, in contrast, more often seek to improve and, as such, allocate their attention in a less-biased fashion. These individuals, then, were left with less-biased impressions of how well they performed. The view that intelligence is fixed, then, introduces error into self-judgments by virtue of inspiring behaviors, such as allocating attention in biased ways, that allow them to hold overly positive views of their performance.

More generally, the work summarized in this piece suggests that there are both motivational and cognitive factors that introduce error into self-assessments. While a simple desire to believe that one has performed well may not be enough to produce overconfident assessments of performance, it does seem to inspire the sort of behaviors that make overconfidence possible. This work also suggests a means of inspiring more accurate impressions of one's performance. Offering incentives for people to be accurate does not seem to work. Instead, one must change the behaviors that people engage in to maintain positive beliefs. Carol Dweck and I have succeeded in doing this in two ways (Ehrlinger & Dweck, 2007). First, forcing entity theorists to attend to the times that they are having difficulty and reducing their focus on times when they are performing well leads to a dramatic drop in overconfidence. While this manipulation was successful in improving self-assessments, it is not one that is easily imported to real-world tasks. However, our second means of improving the accuracy of self-assessments is quite generalizable. Teaching participants that intelligence is something that can be improved on lead them to allocate their attention in even handed ways and display less overconfidence.

Thus, the bad news is that overconfidence is rampant in highly important areas of people's lives, but the good news is that we are beginning to understand its basis and to find ways to curb it.

Short Biography

Joyce Ehrlinger's research centers on issues in social cognition and judgment and decision-making. In particular, she is fascinated by self-perception and, as such, much of her work focuses on understanding accuracy and error in self-judgment. Her current work continues to explore the sources of error in self-assessments but also extends to other interesting topics such as ironic effects of focusing on one's goals, how motivation can shape beliefs about intelligence and when we are most likely to feel as though the grass is always greener on the other side. After earning her doctoral degree from Cornell University in 2004, Dr. Ehrlinger completed a 2-year postdoctoral position at Stanford University before beginning her current position as Assistant Professor in Psychology at Florida State University.

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Endnote

* Correspondence address: 1107 West Call Street, Tallahassee, FL 32306-4301, USA. Email: ehrlinger@psy.fsu.edu.

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