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Is Overconfidence a Motivated Bias? Experimental Evidence

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Are overconfident beliefs driven by the motivation to view oneself positively? We test the relationship between motivation and overconfidence using two distinct, but often conflated measures: better-than-average (BTA) beliefs and overplacement. Our results suggest that motivation can indeed affect these faces of overconfidence, but only under limited conditions. Whereas BTA beliefs are inflated by motivation, introducing some specificity and clarity to the standards of assessment (Experiment 1) or to the trait's definition (Experiments 2 and 3) reduces or eliminates this bias in judgment overall. We find stronger support for a cognitive explanation for overconfidence, which emphasizes the effect of task difficulty. The difficulty of possessing a desirable trait (Experiment 4) or succeeding on math and logic problems (Experiment 5) affects self-assessment more consistently than does motivation. Finally, we find the lack of an objective standard for vague traits allows people to create idiosyncratic definitions and view themselves as better than others in their own unique ways (Experiment 6). Overall, the results suggest motivation's effect on BTA beliefs is driven more by idiosyncratic construals of assessment than by self-enhancing delusion. They also suggest that by focusing on vague measures (BTA rather than overplacement) and vague traits, prior research may have exaggerated the role of motivation in overconfidence.

Keywords: self-perception, overconfidence, motivation, better-than-average effect, specificity

People claim to be better than others on a variety of traits and attributes, including honesty (Brown, 2012), leadership skills (Dunning, Heath, & Suls, 2004), popularity (Zuckerman & Jost, 2001), and safe driving (Svenson, 1981). Business people claim that their firms are better than the average firm (Cooper, Woo, & Dunkelberg, 1988; Larwood & Whittaker, 1977), engineers report that their work is superior to their peers' work (Zenger, 1992), and venture capitalists are overconfident in their ability to predict which entrepreneurs will succeed (Zacharakis & Shepherd, 2001). Although prior theory and research have suggested that the desire to be better than others on a certain dimension drives individuals' inflated beliefs, we test this proposition experimentally and compare it with a cognitive account of overconfidence.

Overconfidence: Better-Than-Average (BTA) Versus Overplacement

The term *overconfidence* generally describes several constructs that measure inflated views of the self. This article focuses on two related but distinct forms of overconfidence: BTA beliefs and overplacement (see Figure 1). Although these terms relate to the same construct, and the literature often uses them interchangeably, BTA and overplacement are typically measured in different ways, and their distinction is important for researchers' theoretical arguments and empirical studies (Larrick, Burson, & Soll, 2007).

BTA beliefs refer to cases when the majority of people in a group claim that they are better than the median (e.g., when an entire

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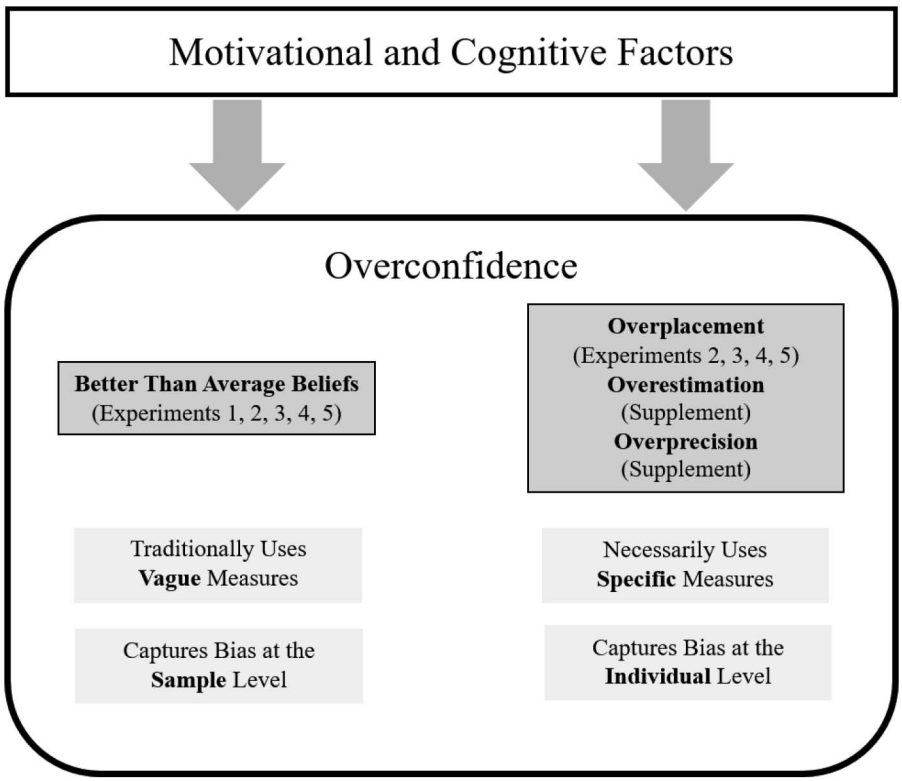

Figure 1. This figure details the differences between the two different but related forms of overconfidence: better-than-average (BTA) beliefs and overplacement.

class thinks they performed higher than the class's median score), which is mathematically impossible. *Overplacement* is manifested by an exaggerated estimate of one's standing relative to other individuals, such as when a student thinks she achieved a higher percentile ranking on a test than she actually did (Moore & Healy, 2008). Measures of BTA beliefs compare individual beliefs to a group-level statistic, whereas overplacement compares individuals' beliefs with their own individual-level performance. Therefore, BTA measures are vaguer than overplacement, and, though widely used in research on overconfidence, are poorly suited to detect bias in individual judgment (Benoît, Dubra, & Moore, 2015; Harris & Hahn, 2011). Overplacement allows researchers to differentiate between realistic and unfounded claims of superiority at the individual level (Krueger & Wright, 2011). Yet, researchers can only measure overplacement when an objective benchmark is available for assessing the accuracy of individual beliefs.

We contribute to the research on both BTA beliefs and overplacement by marrying them in experimental designs that allow us to identify interactions between motivation and specificity. For the sake of consistency in our discussions and definitions, we refer to people's beliefs of their relative standing as BTA when measured at the group level. We refer to overplacement when comparing people's beliefs of their relative standing with their actual standing.

A Motivational Account of BTA Beliefs

Many have argued that BTA beliefs are driven by the desire to view oneself positively (Dunning, 2005; Fabricius & Büttgen, 2013; Greenwald, 1980; Kunda, 1990; Radhakrishnan, Arrow, & Sniezek, 1996; Sedikides & Gregg, 2008; Taylor & Brown, 1994). In fact, the assumption that flattering self-perceptions are motivated is so pervasive that some have claimed a "well-established connection between traditional optimism biases and motivated reasoning" (O'Brien, 2013, p. 847) and that "the better-than-average bias is caused by our strong unconscious desire to maintain a positive self-view" (Chamorro-Premuzic, 2013, p. 12). Although it is entirely plausible that the motivation to view oneself in a positive light could drive excessively positive self-perceptions, causal evidence to support this claim is surprisingly sparse. Studies have found correlations between motivation and "better-than-average" beliefs for general traits, such as honesty and intelligence (Kunda, 1990). But as with all correlational evidence, these findings are amenable to several causal explanations. Other studies (e.g., Alicke & Govorun, 2005) have found that BTA beliefs increase under ambiguity but have not causally linked these increases to motivation.

We tested the role of specificity as a moderator of the relationship between motivation and overconfidence. Our studies vary the ambiguity of the domain or construct, as well as the specificity of the measure that people use for rating themselves and others (BTA vs. overplacement measures). The results allow us to reconcile discrepant findings and address limitations in the prior literature. In addition, we compare the effects of motivational influences on self-enhancement with well-established cognitive effects from the overconfidence literature.

Prior Evidence for a Motivational Account

Existing evidence for the motivational origins of BTA beliefs generally shares three limitations: reliance on correlational evidence, confounding trait commonness with importance, and vague performance standards. We first outline these shortcomings and then detail how our experiments address them.

Correlational evidence. Earlier studies on desirability and self-perception found that people are more likely to hold positive self-perceptions in domains they value (Alicke, 1985; Kunda, 1990; Mazar, Amir, & Ariely, 2008), including those valued distinctively by their own cultures (Sedikides, Gaertner, & Toguchi, 2003) and those useful for obtaining future goals (Dunning, 1995). These correlational findings, however, suffer from a number of shortcomings. One is that they leave open several different causal paths. People might express BTA beliefs for traits and skills in domains they initially value (e.g., if someone values honesty, they may overestimate how honest they are relative to others). Or they might assign greater importance to domains where they already consider themselves skilled (e.g., if someone observes their own honest behaviors, they may begin to place more value on honesty). Or they might, quite sensibly, work to develop traits and skills in domains they believe are important (e.g., if someone values honesty, they may endeavor to behave honestly).

Dunning, Meyerowitz, and Holzberg (1989) found that people displayed a larger BTA effect for positive than negative traits. Their participants ranked themselves in the 59th percentile, on average, for the traits "talented" and "athletic" but in the 39th percentile (below the median) for the traits "trouble handling money" and "socially anxious." As with so much of the evidence, this study did not exogenously manipulate motivation, but instead examined different domains that varied not only in valence, but also in other aspects. Consequently, there are many possible explanations for their results. It is possible, for instance, that the selected traits were not just negative but also less vague or considered rare (Kruger & Savitsky, 2009), which led people to consider that they embodied those traits less.

Confounded evidence. One noteworthy study manipulated motivation while holding a list of traits constant (Brown, 2012). This study found a relationship between a trait's importance and the magnitude of BTA beliefs participants exhibited. Traits described as "important and rare" yielded larger effects than those described as "unimportant and common." Unfortunately, this manipulation confounded importance with commonness, which appears to drive BTA beliefs more than importance does (Chambers, Windschitl, & Suls, 2003; Kruger & Burrus, 2004). If the manipulation led participants to believe that others lacked the important traits, then it would be sensible for them to infer that they were better than others. It is therefore possible that Brown's results are more attributable to perceived commonness than to desirability or motivation.

Vague performance standards. A third limitation of the extant self-enhancement literature is a reliance on assessments within vague domains, using undefined or poorly defined criteria and measures of assessment (Alicke & Govorun, 2005). In most cases, BTA beliefs are elicited by asking participants how well certain traits (e.g., honest, kind, responsible, intelligent) describe them.[1] These traits are typically not defined and are open to different interpretations.

One problem with using vague personality traits and measures is that they are likely to overestimate bias if self-serving attributions are stronger for vague contexts and traits compared with more precise contexts and traits (Dunning et al., 1989; Sloman, Fernbach, & Hagmayer, 2010). Another problem is that ambiguous domains come with idiosyncratic assessment criteria (Weinstein, 1980; Weinstein & Lachendro, 1982). If people use different definitions to assess performance, then everyone can (correctly) claim that they are better than others (van den Steen, 2004). For example, some people may consider themselves honest if they fulfill their obligations, whereas others may consider themselves honest if they do not steal. In fact, if everyone has their own standards for what it means to be honest, then everyone can claim they are the most honest person in the world, and, by their own quirky standards, everyone would be correct.

A Cognitive Account of Overplacement

Although BTA beliefs and overplacement share psychological origins, methodological differences in how the two constructs are measured have led to differences in their theoretical attributions. Kahneman and Tversky (1996) viewed overconfidence as a cognitive bias caused by errors in processing information. Work specifically on overplacement has offered a cognitive account for the bias (Chambers & Windschitl, 2004; Moore, 2007; Moore, Tenney, & Haran, 2016; Simon, Houghton, & Aquino, 2000), as did studies considering both BTA and overplacement (Burson, Larrick, & Klayman, 2006). These cognitive theories do a good job accounting for important features of the empirical evidence, such as the finding that people underestimate their performance on easy tasks and show underplacement when considering difficult tasks (Burson et al., 2006; Kruger, 1999; Moore & Small, 2007) or the finding that people see themselves as worse than average on rare traits and behaviors (Chambers et al., 2003; Klar, 2002; Klar & Giladi, 1997, 1999; Kruger & Burrus, 2004). Do these cognitive theories leave any room for motivational influences on self-assessment? We attempt to answer this question by directly comparing the effects of motivational and cognitive manipulations on overplacement. Our tests show why doing so matters for understanding the causes of overconfidence.

The Key to Motivational Effects: Vagueness

Prior research has found that vaguely defined domains and traits produce greater self-enhancement (Dunning et al., 1989). Others assert that self-enhancement is driven by desirability and motivated reasoning (e.g., Brown, 2012). These two claims highlight an outstanding question: Is vagueness necessary to find an effect of motivation on BTA beliefs? Kunda (1990) argued that motivation cannot twist any fact to its end—some facts are more easily reinterpreted than are others (see also Armor & Sackett, 2006; Gilovich, Kerr, & Medvec, 1993). We suspect that vagueness is a crucial facilitating mechanism for allowing the expression of motivated impulses on biased beliefs. We test whether motivational effects found on BTA beliefs depend on vagueness.

[1] As noted by a helpful reviewer, some exceptions exist. Some research has elected BTA beliefs using more specific measures, such as percentile estimates (Klar & Giladi, 1997). Unfortunately, these examples are the exception rather than the norm for empirical work on BTA beliefs.

Theorizing that vagueness is necessary for motivation to influence BTA beliefs leads to the prediction of an interaction between motivation and specificity in our experiments. Prior research has not exogenously manipulated both motivation and specificity and thus has been unable to test this interaction. Some work in the motivated cognition literature has manipulated the importance of a single trait and measured either self-perceptions (Kunda & Sanitioso, 1989) or perceptions of others (Klein & Kunda, 1992). Yet, no research, to our knowledge, has manipulated the motivation to possess a single trait and then compared self-assessments with reality. In sum, the existing empirical record calls for further testing of the causal claim that motivation affects overconfidence. It also calls for a test of how the specificity of construct criteria and measures (BTA beliefs vs. overplacement) interacts with motivation to affect overconfidence.

The Present Research: An Overview

Our work seeks to better understand what causes overconfidence by connecting two streams of research on BTA and overplacement that have largely developed in parallel and offer different accounts of the bias. The self-enhancement literature (which relies primarily on BTA measures) has developed nuanced theories of motivation, whereas the overconfidence literature (which relies on measures of overplacement) has focused more on cognitive causes and measurement issues. The two literatures are deeply related but rarely linked. We seek to connect them by providing an empirical test of a motivational explanation and directly comparing the strength of motivational and cognitive forces. In addition, we conduct experimental manipulations of both motivation and vagueness in order to test a causal connection between motivation and overconfidence in its different forms. If overconfidence is motivated, then people should display greater overconfidence for abilities or attributes they consider important. But manipulating motivation, rather than measuring its correlates, is key to identifying a causal relationship between motivation and overconfidence.

We systematically vary the specificity of people's self-assessments and examine its effects on the relationship between motivation and overconfidence. The experiments in this article progress from vague to specific in the following ways:

1. Criteria of assessment (vague traits to clearly defined traits): For example, people can assess how honest they are on a single measure or assess their honesty as defined by specific behaviors: "When I make a promise, I keep it" and "I do not say things I know to be untrue."

2. Measures of assessment (vague, verbally labeled BTA measures to numeric, verifiable elicitations of overplacement): For example, people can assess their honesty on an 11-item honesty questionnaire, ranging from 0 (*not at all*) to 11 (*very*). The former measure is more common in the self-enhancement literature, whereas the latter appears more often in the overconfidence literature.

3. Domain of assessment (personality traits to test performance): General personality traits, for example, are not objectively measurable. But when people assess how they did on a math test, their performance is based on the objective number of correctly answered questions.

In Experiments 1, 2, and 3, we manipulate motivation by varying how desirable it is to possess a trait. Experiment 1 employs assessments of a single trait (introversion), defined vaguely. Experiment 2 introduces a specific, numeric measure of assessment (overplacement) for introversion. Experiment 3 uses a new method for operationalizing specificity, by eliciting both BTA beliefs and overplacement for an unfamiliar trait. We invented the trait for purpose of the experiment.

Experiment 4 compares how motivational and cognitive factors affect BTA beliefs and overplacement. Experiment 5 compares how motivation influences both BTA and overplacement measures within an objective domain, performance on math and logic questions. Unlike subjective trait assessments, using an objective domain provides a benchmark for comparing participants' beliefs against reality. It also increases verifiability of assessments, which should suppress bias if motivation only affects vague self-assessments.

Our manipulations of importance represent an attempt to understand how motivation affects overconfidence more broadly. But any such attempt is incomplete without an examination of what people mean when they claim they are better than others. Therefore, in Experiment 6, we vary trait criteria specificity within-subjects. Doing so allows us to observe the emergence of overconfidence on vague measures, its reduction through clearer criteria, and whether it subsequently reemerges with measures that allow for idiosyncratic definitions. The within-subject manipulation also allows us to examine whether people's trait construals are idiosyncratic and whether these construals play a role in driving inflated relative self-perceptions. Table 1 summarizes the experimental designs.

For all of our experiments, we report all conditions, and how we determined sample sizes. We determined sample sizes a priori, striving for at least 80% power. When possible, these power

Table 1
Subjectivity Systematically Varies Across Experiments

Experiment	Domain	Measure
1	Subjective (introversion)	Vague (with vague and specific criteria)
2	Subjective (introversion)	Vague and specific (consensus definition)
3	Subjective (social responsiveness)	Vague and specific
4	Subjective (social responsiveness)	Vague and specific
5	Objective (test)	Vague and specific
6	Subjective (honesty)	Vague and specific (idiosyncratic definitions)

analyses relied on effect sizes revealed in prior experiments in the article. Where that was not possible, we estimated smaller effects for a conservative test (using larger sample sizes). Final sample sizes include the number of participants after removing survey responses based on preregistered exclusion criteria (Experiment 1: $N = 200$; Experiment 2: $N = 666$; Experiment 3: $N = 391$; Experiment 4: $N = 359$; Experiment 5: $N = 111$; and Experiment 6: $N = 136$). We report all exclusions and note how the results hold without making any exclusions. All experiments were approved by the appropriate institutional review boards. Materials, data, syntax, supplemental results, and our preregistrations for these experiments (all experiments but Experiment 5 were preregistered) are posted on the Open Science Framework (https://osf.io/qayhz).

Experiment 1: Self-Assessments of a Vague Versus Specific Trait

Experiment 1 tests the effect of motivation and specificity on BTA beliefs. Prior research on overconfidence has found that people see positive traits as more characteristic of themselves than of others. However, specifying the definitions of such traits should reduce variation in construals of performance, which should attenuate overconfidence (Preuss & Alicke, 2009) let alone any potential effect of motivation on overconfidence. Therefore, we varied the specificity of the trait's description, predicting that this would moderate the effect of motivation.

Whereas prior work compared different traits that might vary in importance, we systematically varied the perceived importance of a single trait: introversion. Introversion has the advantage that people can view it as either desirable or undesirable (Cain, 2013). We manipulated the motivation to view oneself as introverted by varying the trait's perceived importance and measured the extent to which people viewed themselves as more introverted than others.

Method

Participants. Two hundred and twelve people (109 women, 103 men; $M_{\text{age}} = 30.22$, $SD = 12.20$) completed two ostensibly unrelated surveys. Fifty-seven participated in the lab at a West Coast university in exchange for course credit whereas the 155 others participated via Amazon's Mechanical Turk for a fee of \$0.45.[2] Our sample size, determined ex-ante, sought 210 participants to detect a medium-sized effect ($f = 0.25$, $d = 0.5$) with 95% power. After excluding 12 participants (details to follow), a final sample of 200 remained.

Design. The experiment had a 2 (motivation: extroversion-important vs. introversion-important) × 2 (specificity: vague criteria vs. specific criteria) between-subjects design. We measured BTA beliefs by the mean difference between participants' ratings of introversion for themselves and others.

Procedure and materials.

Motivation manipulation. Participants completed two ostensibly unrelated surveys on personality traits and leadership. Survey 1 manipulated the motivation to possess introversion by manipulating its importance (Kunda & Sanitioso, 1989). Participants read about one trait that helps people achieve success. In the introversion-important condition, participants read the following about introversion:

> . . . Skills associated with introversion may help people succeed in different areas of life. Introverted people are empathetic as well as good listeners (Wall Street Journal, 2011), which allows them to gain trust from different kinds of people . . .

In the extroversion-important condition participants read about extroversion:

> . . . Skills associated with extroversion may help people succeed in different areas of life. Extroverted people are energetic and talkative which allows them to get along well with different kinds of people (New York Times, 2010) . . .

Details of the pretests for both manipulations are provided in the online supplement (https://osf.io/qayhz). Following the passage, participants listed two examples from their lives of how introversion (extroversion) made them or someone they know a good leader.

Criteria specificity manipulation. On the following page, participants took an ostensibly unrelated survey, Survey 2, in which they rated how well various traits described them and others. The vague condition included only the trait names (introversion, outgoing [extroversion], conscientious, imaginative, agreeable, and honest), whereas in the specific condition, participants read each trait as specified by five relevant behaviors (e.g., Introverted: I work alone when I can rather than with a group). Traits and behaviors appear in Table 2. Obviously, only introversion and being outgoing are relevant to our purposes here; we included the other traits to reduce experimental demand and increase the plausibility of the claim that the two surveys were unrelated.

Measures.

BTA measure (vague). Participants rated how well each trait described them and most other people on a verbally labeled scale ranging from 1 (*not at all*) to 5 (*very*). Both the order of the traits and self- and other-ratings were randomized. We measured BTA beliefs indirectly by calculating the difference between self- and other-ratings. This sort of indirect measure is a more conservative measure of BTA beliefs than direct measures, which consist of a single comparative assessment and typically produce stronger BTA beliefs (Chambers & Windschitl, 2004; Moore, 2007; Otten & van der Pligt, 1996).

Motivation manipulation check. On the last page of the experiment, participants rated how important they thought it was for a person to possess the attributes of introversion and extroversion. Each rating was on a scale ranging from 1 (*not important at all*) to 5 (*extremely important*).

Results

Motivation manipulation check. Excluding 12 participants who failed the manipulation check, those in the introversion-important condition rated introversion as more important ($M = 3.05$, $SD = 0.71$) than those in the extroversion-important condition ($M = 2.58$, $SD = 0.92$), $t(195.43) = 4.10$, $p < .001$, $d =$

[2] Neither the BTA nor manipulation check measures differed significantly between these samples ($ts < 1.44$, $ps > .14$). The number of participants who failed the manipulation check did not differ between the MTurk and lab samples, either ($p = .31$), correcting for unequal variances.

Table 2
Behaviors by Trait in Experiment 1

Trait	Behavior
Introverted	I do not express my happiness outwardly.
	I work alone when I can rather than with a group.
	I am comfortable with silence.
	I am quiet in large groups of people.
	I think about what I am going to say before I say it.
Agreeable	I cooperate in most situations.
	I get along well with others.
	I avoid arguments.
	I think about other people's issues.
	I allow people the chance to explain themselves.
Conscientious	I pay attention to details.
	I am careful when I make decisions.
	I create goals for myself.
	I plan ahead.
	I check my work.
Imaginative	I find inspiration easily.
	I have a lot of ideas to share.
	I find it easy to think of lots of different kinds of ideas for a project.
	I approach problems differently from most people.
	I am curious about alternate outcomes for everyday situations.
Outgoing	I seek out social situations.
	I try to connect and develop relationships with most people I meet.
	I put myself in situations where I am likely to meet new people.
	I introduce myself to people I don't know.
	I initiate conversations.
Honest	If I make a mistake, I own up to it.
	When I make a promise, I keep it.
	I do not say things I know to be untrue.
	I do not purposely deceive others.
	I fulfill my obligations and do what I say I will do.

0.57.[3] Including those 12 participants in the analysis reduces the effect of the motivation manipulation on the manipulation check (high: $M = 2.91$, $SD = 0.87$; low: $M = 2.69$, $SD = 1.03$), $t(209.23) = 1.70$, $p = .09$, $d = 0.23$, correcting for unequal variances. The analyses below exclude the 12 but this exclusion does not materially alter the results.

BTA effect. In aggregate, participants believed that they were more introverted ($M = 3.23$, $SD = 1.62$) than others ($M = 2.77$, $SD = 0.90$), $t(199) = 3.50$, $p = .001$, $d = 0.35$. To compare the magnitude of beliefs between motivation conditions, we subtracted ratings of others from self-ratings for each condition. A 2 (motivation: introversion-important vs. extroversion-important) × 2 (criteria specificity: vague vs. specific) between-subjects analysis of variance (ANOVA) yields significant main effects of both motivation, $F(1, 196) = 18.37$, $p < .001$, partial $\eta^2 = .09$, and criteria specificity, $F(1, 196) = 3.93$, $p = .05$, partial $\eta^2 = .02$, and a significant interaction, $F(1, 196) = 5.57$, $p = .02$, partial $\eta^2 = .03$. As Figure 2 shows, the importance of introversion increases BTA beliefs when the trait is presented vaguely, $F(1, 196) = 20.35$, $p < .001$, partial $\eta^2 = .09$, but this effect is attenuated when introversion is specified and explicitly defined, $F(1, 196) = 2.03$, $p = .16$, partial $\eta^2 = .01$. Analyzing ratings of self and others separately in a repeated measures design yields the same results. For the color version of Figure 2 and all other violin plots, see the online article. For results in the form of bar graphs, see the online supplement (https://osf.io/qayhz).

Discussion

Our first challenge to the assumption that motivation affects BTA beliefs resulted in finding that such an effect exists, but in a limited capacity and under a stringent condition. Motivation inflated BTA beliefs for a vaguely defined trait. Brown (2012), who had participants rate themselves and others on a list of traits, found the same patterns in assessment. However, the effect disappeared when the trait's criteria were specified. These results extend Dunning et al.'s (1989) result that specificity decreases BTA beliefs; they show that vagueness interacts with motivation to inflate overconfident beliefs. In Experiment 2, we conduct a stronger test of a motivation-overconfidence relationship by comparing self-reports of a vague trait with specific, objective scores on a trait questionnaire.

Experiment 2: Specifying Measures of Assessments for Introversion

Experiment 2 tests a new specificity-related moderator on the relationship between motivation and overconfidence. Whereas Experiment 1 found an effect of criteria specificity on BTA beliefs, mea-

[3] Twelve participants failed the manipulation check by either rating introversion as a 1 (*not important at all*) or extroversion as 5 (*extremely important*), if they were in the introversion-important condition, or by rating extroversion as a 1 and introversion as a 5 in the extroversion-important condition.

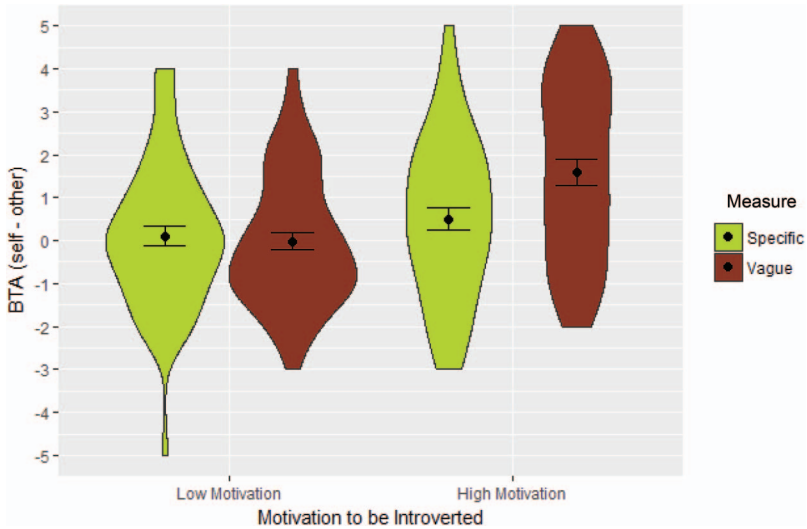

Figure 2. The magnitude of better-than-average (BTA) beliefs as a function of experimental motivation (low: extroversion is important vs. high: introversion is important) and specificity conditions. Error bars represent standard errors. See the online article for the color version of this figure.

sured on the group level, in Experiment 2 we varied the specificity of assessment measures to test the effect of motivation on overconfidence at the individual level. We did this by administering both BTA (vague) and overplacement (specific, individual-level) measures of relative self-assessments. We predicted that overly generous self-ratings, produced by self-serving interpretations of a trait, would diminish when BTA ratings are calibrated against a specific mode of assessment. We tested this prediction by comparing people's assessments of themselves and others to actual scores on an introversion questionnaire.

Method

Participants. Consistent with our preregistered analysis plan, we collected data from 666 Mechanical Turk workers (342 women, 324 men; M age = 34, SD = 12.17), each paid $0.50. We estimated a sample size of 666 to detect an interaction with correlated repeated measures ($r = -.193$), with an effect size of $d = .1679$, with 80% power. We based the effect sizes in this calculation on the results of a prior experiment.

Design. The experiment had a mixed 2-cell (motivation: extroversion-important vs. introversion-important) between-subjects design. We asked people to assess themselves on both vague and specific measures.

Procedure and materials. As in Experiment 1, all participants first read a manipulation passage (Survey 1) and then completed measures of overconfidence (Survey 2). The main difference with Experiment 1 was that here, participants answered both vague (BTA) and specific (overplacement) measures of overconfidence. To measure overplacement, we administered McCroskey's (1997) introversion questionnaire in Survey 2. Participants responded to 18 items describing either introvert or extrovert behaviors. On the following page, we informed participants that the questionnaire they had just completed measured introversion and then asked them to estimate their own and others' scores on it. Thus, all participants answered the BTA measures before the overplacement measures.

Motivation manipulation. The manipulation was the same as Experiment 1. Participants read that either introversion (introversion-important condition) or extroversion (extroversion-important condition) were conducive to personal success.

Measures.

BTA measure (vague). As in Experiment 1, participants assessed how well each trait described themselves and most other people. They did so on a verbally labeled scale ranging from 1 (*not at all*) to 5 (*very*).

Overplacement measure (specific). Participants estimated their own and others' scores on the McCroskey questionnaire. The scores ranged from 12 to 36.[4] We measured overplacement by subtracting an individual's belief that his or her score on the questionnaire was better than others' average scores, correcting for the degree to which they actually were better than others:

$$(\textit{estimated own score} - \textit{estimated others' mean score}) - (\textit{actual own score} - \textit{actual others' mean score}).$$

Results

Motivation manipulation check. An independent samples t-test reveals that participants in the introversion-important condition rated introversion as more important ($M = 3.11$, $SD = .78$) than those in the extroversion-important condition ($M = 2.54$, $SD = .88$), $t(663.61) = 8.82$, $p < .001$, $d = 0.68$, correcting for unequal variances.

Effect of motivation on responses to the introversion questionnaire. We checked whether our manipulation influenced participants' responses on the introversion questionnaire.

[4] Following McCroskey's (1997) scoring scheme, we subtracted the sum for the extroversion items from the sum for the introversion items plus 40.

Indeed, participants in the introversion-important condition had higher introversion scores ($M = 25.88$, $SD = 6.43$) than those in the extroversion-important condition, ($M = 24.00$, $SD = 6.66$), $t(663.61) = 8.82$, $p < .001$, $d = .15$.

Effect of motivation on BTA and overplacement. We standardized the vague and specific measures and submitted them to a 2 (motivation: introversion-important vs. extroversion-important) × 2 (specificity of measure: vague vs. specific) mixed ANOVA with specificity as a repeated measure.[5] The analysis yields a significant main effect of motivation, $F(1, 664) = 49.25$, $p < .001$, partial $\eta^2 = .07$, and an interaction between motivation and specificity, $F(1, 664) = 8.10$, $p = .006$, partial $\eta^2 = .01$. As Figure 3 shows, the specificity of the measure decreases the effect of motivation on overconfidence. Because participants' actual scores were affected by motivation in the same direction as their self-assessments, these exaggerated beliefs emerge above and beyond differences in actual scores.

Discussion

Experiment 2 replicates Experiment 1's primary result, showing an effect of motivation on BTA beliefs for vague personality traits. Personality traits, as usually studied, are vague enough that they allow people to construe the meaning of a trait in a way that provides little verifiability of assessment. It is possible that when introversion was presented as important, people claimed to be more introverted because they were trying to manage impressions of the experimenter. Another possibility is that the motivation manipulation influenced the way participants thought about what it meant to be introverted such that they identified more ways in which their behavior could qualify as introverted. However, even within the subjective domain of personality traits, motivation affected vague (BTA) measures much more than it did specific (overplacement) measures. This result suggests that specificity of measures may suppress the effect of motivation on overconfidence, even within a subjective domain, and that the influence of motivation on overconfidence is tenuous.

An alternative explanation to the moderating effect of specificity is that participants were already familiar with their own level of introversion. We might find a stronger effect of motivation on overplacement for less familiar assessment domains (most people have probably considered how introverted they are). We tested this proposition in Experiment 3 and presented participants with an unfamiliar trait, about which they did not have strong prior beliefs.

Finally, note that the overplacement measure in Experiment 2 cannot distinguish bias from error (Krueger & Wright, 2011). Unless participants are perfectly accurate estimating their relative placement, they will show up as either over- or underplacing. Although a motivated bias is likely to produce overplacement, it can also result from cognitive error, especially when the task is an easy one (Heck & Krueger, 2015). Here, we observe an effect of motivation leading to bias through our manipulation of motivation. In Experiment 4, we cross a motivation manipulation with a cognitive manipulation in order to compare the sizes of these effects and identify the relative influence of bias versus error in driving estimates of placement relative to others.

Experiment 3: Manipulating the Desirability of an Unfamiliar Trait

Although the vague BTA measure in Experiment 2 gave participants more leeway to construe their own introversion in self-flattering ways, the fact that introversion is a well-known trait means that each participant already had some sense of his or her level of introversion. In Experiment 3, we invented a trait, social responsiveness, in order to test the effect of motivation on vague and specific self-assessments for an unfamiliar trait.

Method

Participants. Three hundred and ninety-one Mechanical Turk workers (193 women, 198 men; $M_{age} = 33$) completed the experiment.[6]

Design. The experiment had a 2 (motivation: low vs. high) × 2 (order of measures: vague first vs. specific first) between-subjects design. The dependent variables included counterbalanced vague (BTA) and specific (overplacement) measures. We also collected measures of other forms of overconfidence, overestimation, and overprecision for this experiment and those following; results for these other measures are available in the online supplement (https://osf.io/qayhz).

Procedure and materials. Participants answered a social responsiveness questionnaire that we created. It included 14 short statements which described various behaviors and attributes of people. We asked each to, "rate how much each sentence accurately describes you, as you are today (not as you once were or strive to be)." Items included, among others, "People like to talk to me about various subjects" and "I can sense when a friend is in a bad mood." Participants responded to each item on a scale ranging from 1 (*not at all*) to 7 (*completely*). See survey materials posted on https://osf.io/qayhz for all 14 statements.

Motivation manipulation (Desirability). Following this questionnaire, participants encountered our manipulation, the perceived desirability of social responsiveness. We manipulated perceived desirability through the description of the (invented) trait. Those in the high motivation condition read that people high in social responsiveness were more fulfilled, happier, and healthier. Those in the low motivation condition read that those low in social responsiveness were more comfortable with themselves, successful, and happy (the full passages are in the online supplement). Next, to reinforce the manipulation, all participants typed out two

[5] In the online supplement, we additionally present our results prior to standardization for Experiments 2, 3, 4, 5, and 6. The table in the online supplement (https://osf.io/qayhz) show how motivation influences our measures, with the sign of the measures preserved (positive is overplacement and negative is underplacement).

[6] We pre registered a sample of 200 participants based on an estimation of the appropriate sample size. Our pre registered exclusion criteria would have had us drop participants in the high-motivation condition who responded below a 4 on the manipulation check, and participants in the low-motivation condition who responded above 2. Because this stringent criterion would have led us to drop so many cases, we wound up collecting complete surveys from 391 participants to reach our planned sample size. Subsequently, we concluded that excluding data from so many participants was problematic. The online supplement (https://osf.io/qayhz) reports the same analyses with the smaller sample. The results are not materially different.

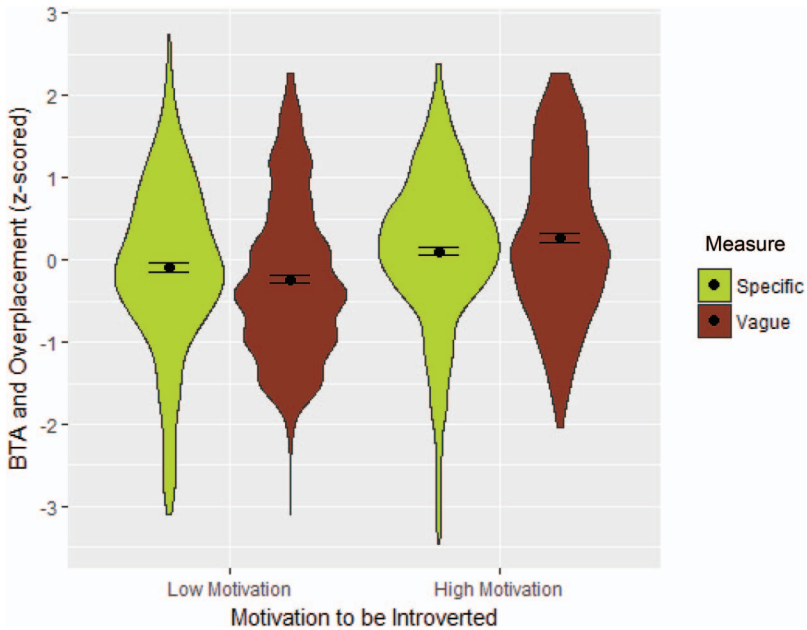

Figure 3. The magnitude of overconfidence for introversion as a function of experimental motivation condition (low: extroversion is important vs. high: introversion is important) and specificity of measure (vague: better-than-average [BTA] vs. specific: overplacement), for participants who saw the manipulation before making self-assessments. Error bars show standard errors. See the online article for the color version of this figure.

examples of how social responsiveness (either higher or lower) "has contributed to success or happiness in your life."

We tested whether participants read the manipulation with a simple comprehension check. Then, participants answered a manipulation check, rating "How desirable do you think it is for a person to have high social responsiveness?" on a scale ranging from 1 (*undesirable*) to 5 (*desirable*).

Measures. Following the manipulation, all participants assessed themselves and others using both specific and vague measures. The order manipulation varied whether the vague or the specific measures came first.

BTA measure (vague). There were two vague measures: "To what degree do you believe that you are high in social responsiveness?" and "To what degree do you believe that the average participant in this study is high in social responsiveness?" Participants answered each question on a scale ranging from 1 (*very low*) to 7 (*very high*).

Overplacement measure (specific). Participants reported their beliefs about their own and others' scores on the 14-item social responsiveness questionnaire. In order to impress upon participants our interest in accurate responding, we included a header on the page: "Please try to be as accurate as you can in answering these questions" and rewarded participants' accuracy in each of the two estimates: "The closer your estimate is to the truth, the better your chances of winning a $25 prize." As in the previous studies, we subtracted the difference between participants' own and others' actual scores from the difference between the scores they *estimated* for themselves and others:

$$(\textit{estimated own score} - \textit{estimated others' mean score}) - (\textit{actual own score} - \textit{actual others' mean score}).$$

Results

Participants completed the social responsiveness questionnaire before they encountered the motivation manipulation, which made it impossible for the manipulation to affect their scores. Indeed, responses on the questionnaire were similar among those in the high motivation ($M = 5.11$, $SD = 1.04$) and low motivation ($M = 5.13$, $SD = .94$) conditions, $t(389) = .145$, $p = .884$. The manipulation check reveals that those in the desirable condition rated social responsiveness as more desirable ($M = 4.47$, $SD = .79$) than did those in the undesirable condition ($M = 2.67$, $SD = 1.17$), $t(333.27) = -17.79$, $p < .001$.

Estimations of performance (Self-Ratings). We standardized both specific score estimates and vague ratings of own score and submitted them to a 2 (motivation: low vs. high) × 2 (order of measures: vague first vs. specific first) × 2 (specificity of measure: vague vs. specific) mixed ANOVA with specificity as a repeated measure. The analysis yields an effect of desirability, $F(1, 387) = 41.49$, $p < .001$, partial $\eta^2 = .097$, but not a significant interaction between desirability and specificity, $F(1, 387) = 3.07$, $p = .081$, partial $\eta^2 = .008$. This was qualified by a three-way interaction, $F(1, 387) = 5.66$, $p = .018$, partial $\eta^2 = .014$. This three-way interaction suggests that the effect of desirability is strongest on vague measures, especially when the vague measures come first. None of the other main effects or interactions are significant.

Overplacement and BTA. We measured overplacement by subtracting an individual's belief that his or her score was better than others' average scores, correcting for the degree to which they actually were better than average. In order to compare overplacement with the BTA measure, we standardized and submitted them to a 2 (motivation: low vs. high) × 2 (order of measures: vague

first vs. specific first) × 2 (specificity of measure: overplacement vs. BTA) mixed ANOVA. The results reveal a significant main effect of desirability, $F(1, 387) = 45.69$, $p < .001$, partial $\eta^2 = .077$. The Desirability × Specificity interaction is not significant, $F(1, 387) = 3.68$, $p = .06$, partial $\eta^2 = .09$, but the effect of motivation is directionally stronger for the vague than the specific measure. None of the other main effects or interaction effects are significant (ps $> .23$).

Discussion

In Experiment 3, we measured participants' beliefs about "social responsiveness," a trait with which they had no prior experience. On the one hand, focusing on this trait allowed for a stronger manipulation of the trait's desirability; indeed, we observed stronger effects of desirability than in the previous two experiments. On the other hand, participants' intuitive perceptions of the trait were less concrete than of more familiar traits, and thus more ambiguous. For this reason, we believe their self-assessments on both the vague and specific measures were more pliable and thus more susceptible to motivational influences than previously observed. The following experiments address this concern and compare the effects of motivational and cognitive manipulations on self-assessments.

Experiment 4: Cognitive Versus Motivational Processes

Experiment 4 compares cognitive and motivational accounts for BTA beliefs and overplacement. Cognitive accounts for biased self-assessments highlight a key component of task difficulty. Moore and Healy (2008) show that overplacement and BTA beliefs are highest on easy tasks, but reverse on hard tasks. Therefore, in Experiment 4, we manipulated both motivation and difficulty. As in Experiment 3, we manipulated the desirability of social responsiveness. Additionally, we varied the criteria for being considered socially responsive, thereby manipulating how difficult it was for participants to claim they possess the trait.

Method

Participants. We obtained completed surveys from 426 participants via Amazon's Mechanical Turk, each paid $0.50. Our preregistered exclusion criteria led us to drop 47 participants who failed the attention check and another 20 who completed the survey in under 5 min or more than 25 min. That left us with 359 participants (165 women, 194 men; $M_{age} = 34$), just over our planned sample size of 356. We estimated that sample size ex-ante to detect an interaction we estimated would be small ($d = 0.20$) between desirability and specificity with 80% power.

Design. The experiment had a 2 (motivation: low vs. high) × 2 (criterion difficulty: low vs. high) × 2 (order of measures: vague first vs. specific first) between-subjects design. As in Experiment 3, we manipulated motivation by varying the desirability of social responsiveness, a trait which was unfamiliar to participants. We measured participants' overconfidence using vague (BTA) and specific (overplacement) measures, counterbalancing the order. Additionally, we manipulated the difficulty of the criterion for possessing the trait.

Procedure and materials. The procedure and materials were similar to Experiment 3 except for one major difference. We altered the social responsiveness questionnaire in order to manipulate how difficult it was for participants to claim that they were socially responsive.

Motivation manipulation. We varied motivation using the same desirability manipulation as Experiment 3, and then administered a 13-item social responsiveness questionnaire. Participants answered "yes," "no," or "unsure" as to whether each of the statements described them (instead of answering how much each described them, ranging from 1 to 7, as in Experiment 3).

Difficulty manipulation. The questionnaire items varied between subjects; we manipulated difficulty by varying the stringency of the threshold for being able to answer "yes" to each item on the questionnaire. Half the participants were presented with a difficult threshold. For example, "In the past day, there have been at least five times where I have told a white lie to avoid hurting someone else's feelings." The other half had a lower bar for claiming they were socially responsive, "In the past year, there has been a time where I have told a white lie to avoid hurting someone else's feelings." We used the same vague and specific measures of overconfidence as in Experiment 3.

Results

Manipulation checks. All participants completed the social responsiveness questionnaire before the desirability manipulation, so that it could not affect their responses to the questionnaire. As expected, a 2 (motivation: high vs. low) × 2 (difficulty: high vs. low) ANOVA found a main effect of difficulty on participants' scores, $F(1, 355) = 455.38$, $p < .001$, partial $\eta^2 = .06$, but no effect of desirability, $F(1, 355) = .02$, $p = .90$, partial $\eta^2 < .001$, or an interaction, $F(1, 335) = 0.50$, $p = .48$, partial $\eta^2 = .001$.

As expected, participants in the difficult condition estimated lower scores ($M = 5.68$, $SD = 3.14$) than participants in the easy condition ($M = 8.36$, $SD = 2.73$), $t(347.62) = 8.64$, $p < .001$, $d = -.91$. The desirability manipulation worked as well: participants in the high motivation condition thought social responsiveness was more desirable ($M = 6.24$, $SD = 0.87$) than participants in the low motivation condition ($M = 2.84$, $SD = 1.56$), $t(247.13) = 24.88$, $p < .001$, $d = 2.69$. To compare the effect sizes of each manipulation, we converted Cohen's d effect sizes to Pearson correlations and compared them using a Fisher's exact test. This analysis suggests that the desirability manipulation was stronger than the difficulty manipulation ($z = 4.78$, $p < .001$).

Estimations of performance (Self-Ratings). We standardized both specific score estimates and vague self-ratings and submitted them to a 2 (motivation: low vs. high) × 2 (difficulty: high vs. low) × 2 (order of measures: vague first vs. specific first) × 2 (specificity of measure: vague vs. specific) mixed ANOVA with specificity of measures as a repeated measure. The results reveal three significant two-way interactions. As in Experiment 3, there was a significant interaction between specificity and desirability, $F(1, 355) = 29.51$, $p < .001$, partial $\eta^2 = .078$. This finding suggests that desirability had a more powerful effect on vague than specific measures. The interaction between specificity and order, $F(1, 355) = 5.95$, $p = .02$, partial $\eta^2 = .017$, suggests that although self-assessments were lower when the specific measures were first, this effect was particularly dramatic for the vague

measures. Specificity and difficulty also displayed a significant interaction, $F(1, 355) = 46.07$, $p < .001$, partial $\eta^2 = .116$, suggesting that difficulty had a larger effect on specific than vague self-ratings. Figure 4 presents these three interactions.

Overplacement and BTA. We standardized participants' (vague) BTA and (specific) overplacement measures and submitted them to a 2 (motivation: low vs. high) × 2 (difficulty: high vs. low) × 2 (specificity of measure: vague vs. specific) mixed ANOVA. Specificity interacted with both difficulty, $F(1, 351) = 7.60$, $p = .006$, partial $\eta^2 = .021$, and desirability, $F(1, 351) = 7.30$, $p = .007$, partial $\eta^2 = .020$, as shown in Figure 5. We observe neither an interaction between desirability and difficulty nor a three-way interaction, suggesting that motivation and difficulty did not differentially affect the measures. Figure 5 presents these interactions and shows that, directionally, desirability influenced the (vague) measures of BTA more than the (specific) measures of overplacement, whereas difficulty influenced the specific measures more than the vague ones.

Discussion

This experiment's findings replicated Experiment 3's effect of desirability on vague vs. specific self-assessments; when respondents viewed social responsiveness as desirable, BTA measures inflated more than overplacement did. These results are not due to a floor effect of desirability on specific self-ratings. Instead, it appears that desirability had a weaker influence than difficulty did. In fact, we found that difficulty had a larger effect on overplacement than on BTA measures. This finding is notable because the manipulation check revealed a strong effect of desirability, suggesting our test of overconfidence was a rather conservative one. Desirability and difficulty both affected vague (BTA) and specific measures (overplacement). Our finding that, despite the increased desirability of the trait, difficulty produced less overplacement, is consistent with the cognitive account for overconfidence (Moore & Healy, 2008).

By inviting participants to think of a time when they were either high or low in social responsiveness, we may have helped remind them of instances that could have affected the degree to which they felt they possessed the trait. If this manipulation boosted the power of motivation by affecting cognitive accessibility, we see that as fundamentally compatible with the routine operation of motivational influence. As we attempted to give motivation its best chance of working, we implemented as powerful a manipulation as we could, and additionally used classic work on motivation as inspiration. We must confess that this motivation manipulation remains imperfect and it is partially a cognitive manipulation, increasing accessibility of trait consistent traits and behaviors. Even though we tried to completely circumscribe a cognitive account within our motivation manipulation, the fact that it is not completely circumscribed should further lay suspicion on the strength of motivation to influence BTA beliefs and overplacement, especially relative to a purely cognitive manipulation. Furthermore, work that examines motivation is often described as "motivated cognition" or "motivated reasoning," which suggests that we are not the only researchers who are unable to perfectly disentangle motivation and cognition.

Whereas Experiments 1 and 2 documented the influence of motivation on vague measures (BTA beliefs) for a vague trait, Experiments 3 and 4 found that the effect on specific (overplacement) measures is weaker. The next experiment sought to test whether the effect of motivation endures even for performance that is specifically measurable and verifiable.

Experiment 5: Estimating One's Own Intelligence

Results of the first four experiments suggest evidence for a causal effect of motivation on overconfidence, but that this effect is limited to vaguely defined assessments of vaguely defined traits. In the previous experiments, we purposefully focused on vague traits in order to create an environment that would prove most amenable to finding motivational effects. In Experiment 5, we

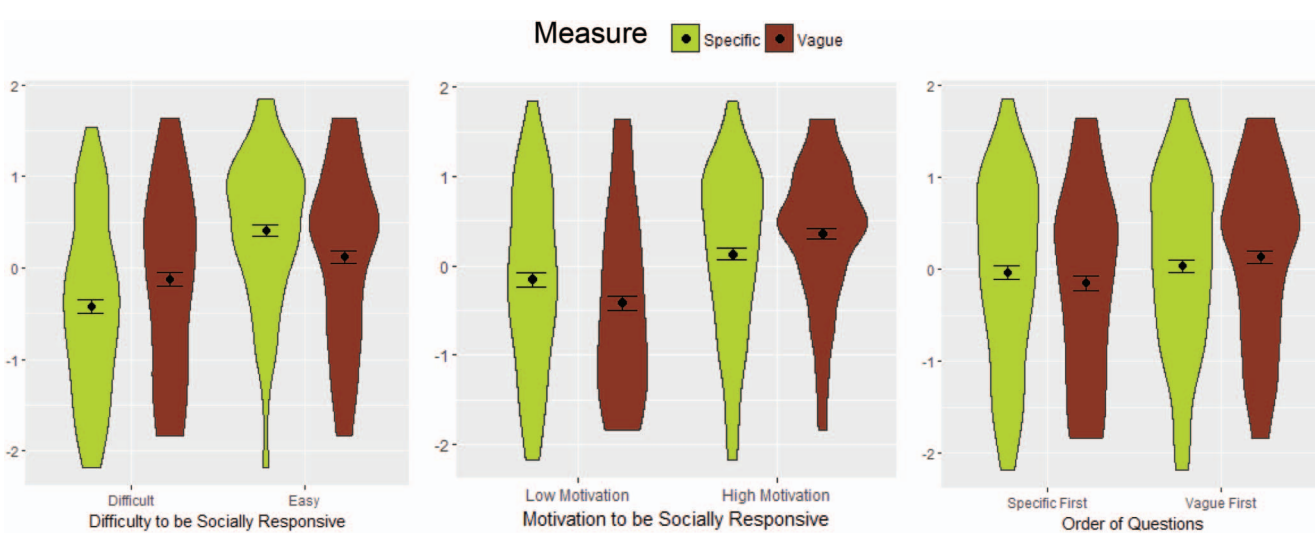

Figure 4. Specific and vague self-reports of participants' scores on the social responsiveness questionnaire (standardized), as a function of the three between-subjects manipulations. Error bars denote standard errors. See the online article for the color version of this figure.

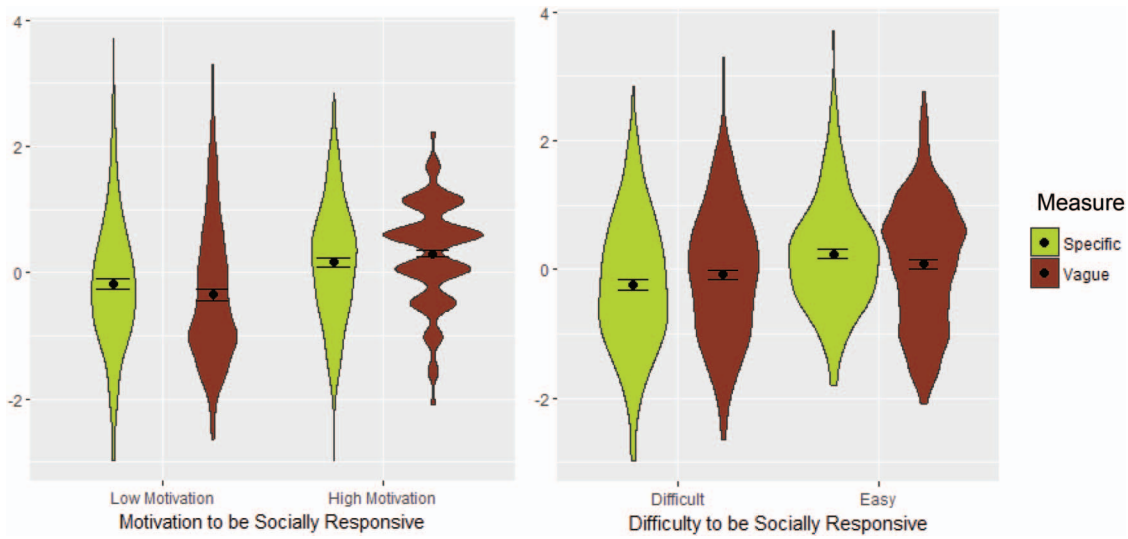

Figure 5. Overplacement of social responsiveness, by motivation, difficulty, and measure specificity. Error bars denote standard errors. See the online article for the color version of this figure.

tested whether the same patterns might extend to objectively verifiable performance. Unlike judgments of personality traits, to which interpretation and subjectivity are inherent, answering scorable knowledge questions is objectively verifiable and measurable. Participants in this experiment answered math and logic questions and assessed their intelligence using both vague and specific measures. Building on the patterns we observed in Experiments 1 and 2, we predicted that the relationship between motivation and overconfidence would weaken within a more objective domain. We varied intrinsic motivation by describing the implications of correctly answering questions.

Method

Participants. One hundred and eleven students and staff at an Eastern university (51 women, 60 men; $M_{\text{age}} = 27$, $SD = 11.23$) completed this experiment. We determined the sample size, prior to data analysis, based on the number of participants we expected to realistically recruit in five experimental sessions. The motivation manipulation in Experiment 4 produced an effect size of $d = 1.2$ on the vague BTA measure, which a sample size of 111 should allow us to detect with 99% probability.

Design. The experiment had a 3-cell (importance: low vs. medium vs. high) between-subjects design.[7] Participants made assessments on both vague (BTA) and specific (overplacement) measures.

Procedure and materials. Participants completed a 10-item test of math and logic puzzles with items taken from online IQ tests. We described the task differently in order to manipulate motivation. Participants estimated their own and others' performance before and after answering the math and logic puzzles.

Motivation manipulation. We orthogonally manipulated intrinsic motivation by manipulating how we described the task. Thus, we manipulated its perceived importance and participants' motivation to perform well. Participants in the high motivation condition read the following:

> In this experiment, you will be taking an intelligence test. Intelligence, as you know, is an important dimension on which people differ. There are many positive things associated with higher intelligence, including the fact that more intelligent people are more likely to get better grades and advance farther in their schooling. It may not be surprising to you that more intelligent people also tend to earn more money professionally. Indeed, according to research by Beaton (1975) 10 IQ points are worth about $4,000 in annual salary. Children's intelligence is a good predictor of their future economic success according to Herrnstein and Murray (1994). Of course, this is partly because, as documented in research by Lord, De Vader, and Alliger (1986) intelligent people are perceived to have greater leadership potential and are given greater professional opportunities. But what may be surprising to you is that intelligent people also tend to have significantly better health and longer life expectancies (see research by Gottfredson & Deary, 2004).

Participants in the medium motivation condition read the following:

> In this experiment, you will complete a short version of an IQ test, which is known to be a good indicator of one's intelligence.

Those in the low motivation condition read the following:

> You will complete a series of questions we are testing to see whether or not they can be used as a quiz in another study.

Measures.

Manipulation check. In order to assess their motivation to perform well, we asked participants, prior to the test, to rate: how

[7] For this experiment, we manipulated both intrinsic and extrinsic forms of motivation to succeed at this task but for the sake of clarity, we report the results of the intrinsic manipulation of motivation. The original design was a 3 (importance: low vs. medium vs. high) × 2 (monetary incentive: present vs. absent) between-subjects design. For all results and a discussion of the monetary (extrinsic) incentives, see the online supplement (https://osf.io/qayhz).

motivated they were, how important it was for them to perform well, and how hard they expected to work. Participants responded on scales ranging from 1 (*not at all*) to 5 (*extremely*).

BTA measure (vague). After the manipulation, we elicited BTA (vague) measures by asking participants to assess their own and others' performance on the test, both before and after taking it, on a scale ranging from 1 (*very badly*) to 5 (*very well*).

Overplacement measure (specific). Overplacement (specific) measures included participants' estimates of their own and others' scores on the test from 0 to 10. We counterbalanced the order in which participants responded to the BTA and overplacement measures.

Results

Manipulation checks. We made no exclusions, we averaged the three manipulation check items together to form one measure of motivation ($\alpha = .83$) and submitted it to a 3-cell (importance: low vs. medium vs. high) ANOVA. There is an effect of importance on participants' ratings of their motivation to succeed on the task, $F(2, 108) = 5.46$, $p = .006$, partial $\eta^2 = .09$, with mean group ratings corresponding to the level of motivation (high: $M = 3.98$, $SD = 0.68$; medium: $M = 3.50$, $SD = 0.89$; low: $M = 3.42$, $SD = 0.89$).

Effect of motivation on BTA beliefs and overplacement. We submitted participants' BTA beliefs to a 3-cell (motivation: low vs. medium vs. high) between-subjects ANOVA. Motivation neither affected BTA beliefs individually before, $F(2, 108) = .17$, $p = .846$, nor after the task, $F(2, 108) = .20$, $p = .817$. Results hold when ratings of self and others were analyzed as a repeated measure (Before: Self-Other × Motivation, $p = .846$; After: Self-Other × Motivation interaction, $p = .817$). The objectivity and verifiability of performance assessment appears to have suppressed the effect of motivation on BTA beliefs altogether.

We submitted the overplacement measure to the same 3-cell ANOVA. Again, the motivation manipulation did not affect overplacement before, $F(2, 108) = .05$, $p = .950$, or after the task, $F(2, 107) = .16$, $p = .853$. Results hold when analyzing estimated and actual differences as a repeated measure.

Importantly, in aggregate, participants did not display BTA beliefs. Before the task, participants predicted that they would perform no better than others, $t(110) = 0.70$, $p = .49$, and afterward believed that they had performed worse ($M = 3.05$, $SD = 1.00$) than others ($M = 3.32$, $SD = 0.75$), $t(110) = -2.77$, $p = .007$, $d = -0.31$. There was only minimal evidence of overplacement before the task and no evidence of it after. People predicted that they would perform better than others ($M = 0.44$, $SD = 1.58$) more so than they actually did ($M = 0.00$, $SD = 1.84$) before the task, $t(110) = 2.26$, $p = .03$, $d = 0.26$, but not after (reported: $M = -0.19$, $SD = 2.07$), $t(109) = -0.98$, $p = .35$.

Effects of motivation on actual performance. We submitted participants' actual performance to a 3-cell (motivation: low vs. medium vs. high) ANOVA. The results revealed no effect of motivation, $F(2, 108) = .51$, $p = .603$, partial $\eta^2 = .009$.

Discussion

Experiment 5 tested a domain where we could measure performance more objectively and found, accordingly, no effect of motivation on overconfidence. In fact, we found little evidence of overconfidence whatsoever, regardless of motivation. Even on vague BTA measures, before the task, people expected to perform no differently than others and believed they had performed worse afterward. Overplacement measures likewise revealed modesty. On average, people only slightly overplaced their scores relative to others prior to the task and did not overplace at all afterward.

Although Experiment 5 differed from the previous experiments in many attributes and a direct comparison between the experiments is difficult, the results of the present experiment are consistent with the cognitive account of overconfidence (Moore & Healy, 2008), as are the findings of Experiments 3 and 4. This account, which has considerable empirical support, predicts that different forms of overconfidence, either in absolute self-evaluations or in relative self-judgments like the ones elicited in this experiment, can disappear, and even reverse, when the level of difficulty changes. Specifically, easy tasks produce overplacement but underplacement can result when difficulty is high. The fact that motivation had no effect on either BTA or overplacement in Experiment 5, given the initially low levels of overplacement and relative high difficulty of the task, provide further support for the cognitive explanation. The result showing that motivation did not affect performance itself is also consistent with past work, which found that people's mindset (their optimism) does not affect performance as much as people think it will (Tenney, Logg, & Moore, 2015).

Experiment 6: Idiosyncratic Construals

Why do people inflate their favorable perceptions of themselves when assessments are vague? One possibility is that they take advantage of vague standards, which do not facilitate an easy comparison with reality, to engage in self-enhancement. Alternatively, people may construct specific criteria for assessment, but differ in how they interpret the meaning of the trait they assess, and thus in the criteria they choose to judge themselves. In the absence of universally defined criteria for possessing the trait, people might construct their own criteria in a way that emphasizes their relative strengths. On the basis of these criteria, their self-assessments would naturally skew positive.

It is possible that people's criteria weightings are driven by self-serving motives to sustain flattering beliefs about the self (Brownstein, 2003). However, it is easiest to maintain the illusion when the self-deception is subtle enough to provide plausible deniability (Kunda, 1990; Shepperd, Ouellette, & Fernandez, 1996). Becoming aware of the artifice undermines the value and credibility of the self-enhancement. Experiment 6 used a within-subjects research design that allowed us to examine people's awareness of applying idiosyncratic criteria. If individuals are aware of the idiosyncrasies in their own self-assessments, then overconfidence does not result from self-deception.

Experiment 6 examines the relationship between the BTA effect and the specificity of a trait—honesty. Unlike introversion, honesty is more universally considered by people as an important, desirable trait; therefore, we could expect all participants to feel highly motivated to possess it. We tested whether people rely on idiosyncratic criteria for honesty or whether they agree about what honesty means but indulge in rosy self-perceptions. Participants assessed their own and others' honesty before and after specifying

what honesty meant to them; they rated the relevance of different dimensions of honesty to their definitions of the trait.[8]

Although a vague attribute may allow for self-serving definitions and flattering self-perceptions, specifying the dimensions of the attribute should reduce idiosyncratic construals. Still, honesty is a complex trait and we measured whether people weighted the specific criteria differently from each other when given the opportunity to construct their own conception of honesty. Therefore, we expected that defining honesty through specific behaviors (in Phase 2), rather than as a vague trait (in Phase 1), would attenuate BTA beliefs, but that stronger BTA beliefs would reemerge when participants can independently adjust their criterion weights for the honesty-related behaviors (in Phase 3).

Method

Participants. One hundred and forty-one undergraduate students at a West Coast university completed one 15-min session for either course credit or pay. We recruited as many participants as the end of the semester allowed prior to analyzing the data.

Design. The experiment had a 2 (target: self vs. others) × 3 (assessment type: vague vs. specific vs. relevance) within-subject design. The assessment type manipulation involved assessing BTA beliefs in three different formats: (1) their own and others' honesty, without clarifying what honesty meant; (2) the frequency at which they display 11 specific honesty-related behaviors; and (3) the relevance of each of these behaviors to their own definition of the trait. We measured BTA beliefs in each of the three phases and then compared them with each other. To determine whether people defined honesty in a self-serving manner, we measured the correlation between (1) how frequently people rated enacting each behavior in the second phase and (2) how relevant that behavior was to their definition of honesty in the third phase.

Procedure and materials.

Vaguely presented traits. In Phase 1, participants rated how well each of the following 10 traits described them and how well they described the average participant in the study: honest, kind, responsible, intelligent, competent, secure, conscientious, agreeable, imaginative, and outgoing. They rated each trait on a scale from 1 (*does not describe me at all*) to 9 (*describes me very well*). We assessed indirect BTA beliefs for each phase by comparing self and other ratings.

Specific behaviors. In Phase 2, participants read 11 statements pertaining to behaviors considered as honest, for example, "When I make a promise, I keep it," "I do not say things I know to be untrue." The full list of statements is in Table 3. For each statement, they rated how often it accurately describes them, on a scale ranging from 0% (*I never do this*) to 100% (*I always do this*). Next, participants estimated their own and others' overall honesty, as defined by the specific behaviors on the list. This judgment explicitly encouraged participants to treat the behaviors as equally important by asking them to average across the 11 items on the list.

Relevance of behaviors to honesty. In the third and final phase of the experiment, we explicitly reintroduced the opportunity to define honesty in a more personal way. Participants reported how relevant each of the same specific behaviors were to their interpretation of honesty on a scale from 0 (*not at all important*) to 100 (*most important*). After rating each of the behaviors in terms of their relevance to honesty, participants used the weights to assess their own and others' honesty on a scale from 0% to 100%. They rated both other students at the school in general and the average participant in the study.

Results

BTA beliefs. We dropped data from five participants whose ratings included no variance, leaving a sample size of 136. To make the ratings from all phases of the experiment comparable with each other, we rescaled the vague ratings of honesty from a nine-point scale to one that spans from 0 to 100. We submitted all ratings to a 2 (target: self vs. others) × 3 (assessment type: vague vs. specific vs. relevance) repeated measures ANOVA. There are main effects of target, $F(1, 135) = 72.06$, $p < .001$, partial $\eta^2 = .35$, and assessment type, $F(2, 134) = 10.47$, $p < .001$, partial $\eta^2 = .14$, and, importantly, a significant interaction between the two factors, $F(2, 134) = 10.11$, $p < .001$ partial $\eta^2 = .13$.

Consistent with the main effect of target, participants displayed BTA beliefs, rating themselves as more honest than others in each assessment phase (ps $< .001$). The bias was weaker when participants considered specific behaviors than when they assessed honesty as a vague trait. As Figure 6 shows, participants rated themselves as more honest than others, even when making assessments on a specific scale ($M_{difference} = 3.99$, $SD = 12.65$), $t(135) = 3.68$, $p < .001$, $d = 0.63$, but this effect was weaker than the one observed in their vague ratings. When participants applied their own idiosyncratic weights to the various behaviors, the BTA effect strengthened again ($M_{difference} = 7.49$, $SD = 12.02$), $t(135) = 7.27$, $p < .001$, $d = 1.25$.[9]

Idiosyncratic definitions of honesty. When allowed to assess their honesty based on their own definitions, participants' BTA beliefs increased relative to the specific assessments, and became more similar to the initial vague assessments. If each person considered the 11 specific behaviors related to honesty in a different, distinct way, then, according to their own definitions, each person could correctly believe they were more honest than others.

For each behavior, we computed a correlation between how frequently people claimed to display it and how relevant they thought it was to their definition of honesty. The frequency and relevance ratings correlated positively for every behavior (rs $> .24$, ps $< .01$; see Table 3). We are cautious to conclude from this correlational result that people weighted the relevance of behaviors in a self-serving manner; we cannot rule out the possibility that the more relevant people thought behaviors were to honesty, the more frequently they displayed them, and that people were aware that others had their own idiosyncratic construals.

[8] A pretest identified the 10 behaviors most strongly associated with honesty. We surveyed 87 students on the campus of a West Coast University and thanked them with candy. Participants read 33 behaviors and rated the five that were most relevant to honesty on a scale from 1 = *captures my idea of honesty the best* to 5 = *captures my idea of honesty the least*. Ten of these behaviors were rated within the top five for more than 50% of participants and thus comprised the list of behaviors we used in Experiment 6.

[9] Specificity affected ratings of others, such that in Phase 3, participants considered the average experiment participant more honest ($M = 74.90$, $SD = 13.87$) than did their fellow students in general ($M = 70.99$, $SD = 14.00$), $t(135) = 4.87$, $p < .001$, $d = 0.28$. This kinder assessment of the average participant implies a conservative test of BTA beliefs in Phases 1 and 2.

Table 3
Honesty Self-Report Items, Their Frequency of Enacting Behavior, and the Correlations Between Frequency and Relevance Weights in Experiment 6

Behavior	Frequency *M*	Correlation between frequency and relevance ratings *R*
I do not cheat on my boyfriend/girlfriend. (5)	89.43	.587***
I fulfill my obligations and do what I say I will do. (4)	86.99	.393***
I do not steal. (8)	86.10	.597***
When I make a promise, I keep it. (1)	86.04	.455***
If I find something of value I do my best to return it to the owner. (10)	83.89	.576***
I live according to my own values. (7)	83.57	.242**
If I make a mistake, I own up to it. (6)	82.50	.348***
(Other) I am honest in ways that the above statements fail to capture. (11)	82.04	.517***
I do not pretend to be something I am not. (9)	76.04	.433***
I do not purposely deceive others. (3)	75.78	.417***
I do not say things I know to be untrue. (2)	74.59	.546***

Note. Behaviors are listed in order of the magnitude of the better-than-average effect. The number next to the trait is the order in which the behavior was presented to participants.
** $p < .01$. *** $p < .001$.

We examined whether these seemingly self-serving definitions corresponded with self-perceptions of honesty. We multiplied frequency ratings by relevance ratings for each behavior, summed the product across behaviors, and measured the correlation of the product with participants' final self-assessments vis-à-vis the different behaviors. It appears that as definitions became more flattering, so did self-assessments ($r = .68$, $p < .001$). We also tested how similar participants' definitions of honesty were to each other and measured the correlation of each participant's relevance ratings with every other participants' ratings. The average of these correlations was low ($r = .09$), which suggests that people did not converge on one definition of honesty.

Discussion

The findings of Experiment 6 shed light on a possible underlying mechanism of the effect of motivation on BTA beliefs. The results suggest that a vague definition of a trait allows people to produce more positive self-evaluations by relying on idiosyncratic criteria for what it means to possess the trait. Using specific criteria, people used idiosyncratic definitions of honesty. Focusing on honesty allowed us to use a domain where people were highly motivated to possess the focal trait. As expected, BTA beliefs were strong both when assessments were based on a vague scale and on personal definitions of the trait. This result suggests that when the desirable trait was originally presented in vague terms, people may have used idiosyncratic interpretations of the trait to assess themselves.

Our results suggest that people appear capable of moderating their own BTA beliefs when the domain is clarified. This result implies that specifying definitions can help people reduce BTA biases. In the present experiment, participants' BTA beliefs were attenuated when we provided specific definitions of honesty, which suggests they knew others might not share their definitions of honesty (see Roy & Liersch, 2013).

Finding an effect of vagueness within-subject and within-trait is important because it shows that people are aware of, and do not try to hide, the degree to which self-enhancing beliefs emerge in the presence of vagueness. The idiosyncratic trait definitions that drive this effect may not be motivated self-delusions. They are conscious and may even be rationally justifiable. The clear implication is that beliefs appearing as self-serving are not driven by an unrealistic self-aggrandizement, but instead by self-consciously idiosyncratic standards of assessment.

General Discussion

Is overconfidence motivated? Our results suggest that motivation affects overconfidence less than the prior literature might suggest. It is most certainly not the case that the desire to possess a trait or ability always leads people to self-enhance. For example, the desire to see oneself as intelligent did not lead our participants to delude themselves into believing they had aced an IQ test. When motivation increases self-enhancement, its effect is strongest for ambiguous traits assessed using vague BTA measures. The striking limitation of these vague measures is that they lack an objective accuracy standard. Getting specific reduces the effect of motivation, and so overconfidence appears less pervasive than the prior literature implies. Our results help to identify both when motivation contributes to self-enhancing beliefs and how people construct these beliefs.

Our results build on prior research that has examined either the vagueness of measurement (Epley & Dunning, 2000; Preuss & Alicke, 2009) or the ambiguity of the trait (Alicke, Klotz, Breitenbecher, Yurak, & Vredenburg, 1995; Dunning et al., 1989). We replicate the main effect of specificity on overconfidence but more importantly, show that specificity interacts with motivation to affect overconfidence. Table 4 summarizes our results. In Experiments 1 and 2, people displayed stronger BTA beliefs when they were motivated to view themselves as introverted, but only when the definition of what it means to be introverted was specific. In fact, the effect weakened when assessments were made on specific measures that captured overplacement. When we elicited judgments in an unfamiliar, vague domain (in Experiment 3), overconfidence emerged again, and this time was not limited to vague measures. Experiment 4 compared the effects of motivational and

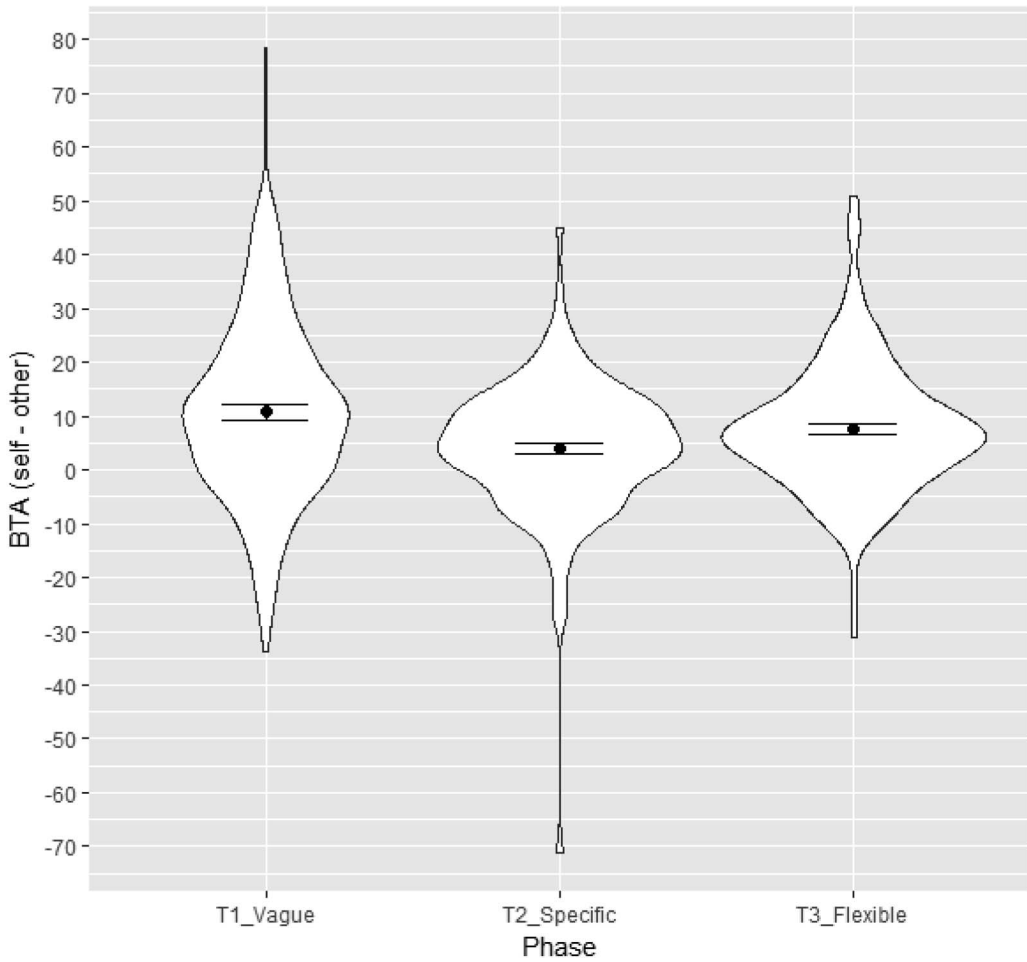

Figure 6. The better-than-average (BTA) effect (self and other difference in reported honesty) within each phase. Error bars denote standard errors.

cognitive factors on overconfidence within the same unfamiliar, vague domain; both affected vague (BTA) and specific measures (overplacement). When the domain itself was objective and verifiable, as was test performance in Experiment 5, motivation's effect on overconfidence again disappeared.

Experiment 6 provided new insight into the psychological mechanisms behind the construction of subjective self-perceptions. Although people were capable of decreasing their BTA biases when criteria were made specific, idiosyncratic definitions also contributed to BTA beliefs. We cannot distinguish the degree to which these idiosyncratic trait definitions are the result of self-serving definitions or whether people simply work to enact those honesty-relevant behaviors they regard as most important. However, our results suggest that a reduction in biased beliefs about one's introversion was due to clarifying not only the trait's measurement, but also what it means to be introverted.

Table 4
Summary of the Effects of Motivation and Difficulty on Overconfidence Across Experiments

Experiment	Results
1	Motivation affects BTA for introversion when criteria is vague but not when it is specific.
2	Motivation affects BTA for introversion more than it affects overplacement.
3	Motivation affects BTA and overplacement for social responsiveness.
4	Motivation and difficulty affect BTA and overplacement for social responsiveness.
5	Little evidence of BTA beliefs or overplacement for intelligence overall. Motivation neither affects BTA nor overplacement.
6	A vague trait on which people are motivated to see themselves possessing the trait, allows for idiosyncratic definitions of what it means to possess the trait, even using specific criteria, which produces more positive self-evaluations.

Note. BTA = better-than-average.

Theoretical Implications

This article contributes to the research on motivated cognition, social comparison and self-perception by providing an empirical examination of a widespread assumption in the field: that the motivation to possess a certain quality drives the degree to which people are biased in their assessments of themselves relative to others (Alicke, 1985; Brown, 2012; Dunning, 1995; Dunning et al., 1989; Mazar et al., 2008). Our results suggest that motivation affects overconfidence mostly in subjective, vaguely framed contexts. These results help us better understand past correlational work on the relationship. Another contribution of this work is the measurement of overplacement, which compares people's beliefs about themselves relative to others with their actual relative standings, as well as the vaguer measure of BTA. Examining both measures together allowed us to increase the resolution of our tests, and capture individual bias rather than only at the level of the sample.

The insights gained from our experiments about the relationship between motivation and overconfidence also contribute to work on self-enhancement. The term self-enhancement is regularly used to describe flattering self-perceptions regardless of their accuracy. Some work has offered a motivational explanation for self-enhancement, similar to the proposed effects on overconfidence (Dunning, 2005; Gosling, John, Craik, & Robins, 1998; Greenwald, 1980; Kunda, 1990; Sedikides & Gregg, 2008). We expand these findings by directly measuring the extent to which people's self-ratings are consistent with reality and how they are affected by motivation.

We should note that a motivational account of overconfidence differs from how researchers have measured wishful thinking. Wishful thinking has often been studied by manipulating desirability (motivation) and measuring the perceived likelihood of future events (e.g., Lench & Ditto, 2008; Marks, 1951; Windschitl, Scherer, Smith, & Rose, 2013; Windschitl, Smith, Rose, & Krizan, 2010). Neither self-enhancement nor wishful thinking requires the benchmark of accuracy, unlike overplacement. Furthermore, experimental evidence suggests that motivation does a poor job explaining empirical evidence of wishful thinking (Bar-Hillel & Budescu, 1995; Bar-Hillel, Budescu, & Amar, 2008; Krizan & Windschitl, 2007; Vosgerau, 2010).

Practical Implications

Are overconfident beliefs self-serving? For them to qualify as such, holding overconfident beliefs would have to benefit the individual. Yet, people are overconfident about success on tasks in which they later regret participating. For instance, people are overconfident about their success in winning arguments, an activity on which they openly regret spending their time (Logg, Minson, & Berg, 2018).

Additionally, risks of overconfidence are easy to identify. Overconfidence, after all, can impair both performance and well-being. Overconfident people risk too much (Camerer & Lovallo, 1999; Odean, 1998). And although we may experience pleasure in savoring a bright future (Loewenstein & Prelec, 1993), those who are most confident in their performance, and who therefore believe they need not try hard, can actually perform worse (Cain, Moore, & Haran, 2015; Stone, 1994; Vancouver, Thompson, Tischner, & Putka, 2002). For instance, the student who is overconfident about his performance and thus does not believe he needs to study is unlikely to outperform his peers.

Overconfidence in one's abilities invites disappointment when performance turns out worse than expected (McGraw, Mellers, & Ritov, 2004; van Dijk, Zeelenberg, & van der Pligt, 2003). People seem aware of the disappointment that follows overconfidence when they display defensive pessimism. In fact, people who lower their expectations through defensive pessimism enjoy their success as much as optimists but are not as distraught by failure (Norem & Cantor, 1986). If self-flattering beliefs are self-interested, then people should display overconfidence in all of the domains they value. Yet, people often display underconfidence in domains they think are important (Blanton, Axsom, McClive, & Price, 2001; Kruger, 1999; Moore, 2007; Windschitl, Kruger, & Simms, 2003), including social status, respect, and influence (Anderson, Srivastava, Beer, Spataro, & Chatman, 2006); for more evidence, just talk to any graduate student.

Our results suggest that one should not always expect greater motivation to beget greater overconfidence. When performance standards are quantitative and objective, our results imply that motivational effects on overconfidence are limited. Some domains, then, are more suitable for presenting such conditions than are others. Within the workplace, success often depends on numbers. A company must turn a baseline profit to continue functioning, which often depends on the number of clients secured or products sold. Athletic champions are determined by the number on the scoreboard and records for speed are based on the clock. However, even if motivation only affects overconfidence in purely subjective contexts, those contexts are not entirely uncommon. Obviously, objective criteria are not always readily available for some consequential outcomes. Mates are rarely chosen based on objective, verifiable, or measurable criteria. Assessment of academic papers depends on subjective assessments made by readers and reviewers. Employee evaluations are, to a great extent, driven by the subjective assessment of the manager. Under these circumstances, we expect wider latitude for subjective construal of performance and stronger effects of motivation on overconfident beliefs.

High levels of overconfidence become more likely when one's goals are not specifically defined, which holds important implications for individuals, managers, and organizations for whom overconfidence may contribute to unmet expectations. Yet, our results are hopeful in that they suggest a path to more accurate self-assessments. Even within ambiguous domains, providing clearly defined criteria for what makes a productive employee, an effective leader, and an efficient team, may help people better calibrate their self-perceptions with reality.

Conclusion

We have sought to test a widely held belief that overconfident beliefs are driven, in part, by the motivation to view oneself positively. We directly manipulated motivation and measured people's beliefs about their relative standing vis-à-vis others to examine what inflates and deflates their positive self-perceptions. We found limited evidence for motivational influence on overconfidence. The most important implication of our findings is the insight into when motivation has an effect and when it does not. Objective, verifiable domains appeared to suppress overconfidence, even on a vague measure. Within a subjective performance

domain, motivation had influence when assessments were made on vague measures but less so on specific measures, and mostly when the trait was vague and less so when it was clearly defined. Indeed, whenever clarity of criteria, measures, and domains allowed for us to compare self-reports with verifiable truth, we found little evidence of a motivational influence on biased beliefs.

Origin Story

This article owes its genesis to questions about the durability and prevalence of overconfidence. Psychologists were routinely taken aback by evidence showing how common it is for people to be underconfident (Moore & Small, 2007). For instance, on difficult trivia quizzes, the majority of people believe that they are worse than others (Moore & Healy, 2008). When presenting this work, we routinely encountered the objection that studying such trivial tasks neglects the powerful role of motivation in driving people's beliefs about consequential performance domains in everyday life. We began this research project with the goal of identifying the role of motivation. Although numerous papers claimed that self-enhancement motivations drove people to believe they were better than others, the evidence for this claim was largely correlational and lacked clean experimental tests. We set out to provide such a test.

When our early results failed to find an effect of our manipulations of motivation on any form of overconfidence, we were stunned. These results made us more skeptical that motivation played the powerful and pervasive role so many had assumed it did. The story of this research project is the story of our search to find a context—any context—in which we could identify an effect of motivation on overconfidence. After a set of results failing to find any effect of motivation on overconfidence, we finally were able to identify when it mattered—when both the performance domain and its method of assessment were sufficiently vague to allow individuals to apply idiosyncratic construals of performance.

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