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True overconfidence: The inability of rational information processing to account for apparent overconfidence

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ABSTRACT

The better-than-average effect describes the tendency of people to perceive their skills and virtues as being above average. We derive a new experimental paradigm to distinguish between two possible explanations for the effect, namely rational information processing and overconfidence. Experiment participants evaluate their relative position within the population by stating their complete belief distribution. This approach sidesteps recent methodology concerns associated with previous research. We find that people hold beliefs about their abilities in different domains and tasks which are inconsistent with rational information processing. Both on an aggregated and an individual level, they show considerable overplacement. We conclude that overconfidence is not only apparent overconfidence but rather the consequence of a psychological bias.

Introduction

Overconfidence is not just an artifact of psychological experiments but seems present in many real life situations where considerable stakes are involved. Overconfident decision making has been observed in financial markets (Odean, 1998), corporations (Malmendier & Tate, 2005), with business entries (Cooper, Woo, & Dunkelberg, 1988) or even marriages (Mahar, 2003). Indeed, overconfidence is perhaps the behavioral bias most readily embraced by academic researchers in economics and finance. In particular the better-than-average effect, which is the tendency of people to rate their skills and virtues favorably relative to a comparison group, yields direct predictions for economic decision making.

In a recent paper, Benoît and Dubra (2009) challenge the notion of overconfidence as it was previously analyzed in psychology and economics. The subject of their criticism is the conventionally used research methodology to demonstrate the better-than-average effect. In a signaling framework, Benoît and Dubra show that rational information processing can lead to the very results formerly interpreted as evidence for overconfidence. This does not rule out true overconfidence as an explanation for these findings, but instead also allows for straightforward Bayesian updating as an alternative explanation.[1]

Despite this setback for the overconfidence literature, it is not sufficient to take a methodological viewpoint on the matter; we have to ask ourselves about the psychological reality of this bias and its relation to other self-serving biases. The assertion that people are overconfident is an appealing explanation for behavior, both on the financial markets and elsewhere. In contrast, rational updating is demanding in terms of people's information processing capacity and the underlying signal structure necessary to produce apparent overconfidence. It therefore seems worthwhile to design a research strategy that would be able to demonstrate the presence of true overconfidence by improving previous research methodology in such a way that it becomes capable of withstanding the critisism of Benoît and Dubra (2009).

We identify the aggregation of beliefs as the feature most damaging to the interpretational value of the traditional experimental setting. The simplest setup asks people to judge whether they believe themselves to be above average in a certain domain, as for example in the famous account on driving ability by Svenson (1981). More advanced designs ask participants to specify the percentile of a distribution they believe themselves to belong to (e.g.

[1] In accordance with Benoît and Dubra, we use the term "true overconfidence" for truly biased self-evaluations. In contrast "apparent overconfidence" stands for data that seems to reflect overconfidence, but where it is not possible to prove the presence of a better-than-average effect. The term "apparent overconfidence" thus includes cases of true overconfidence and other possible causes such as rational information processing.

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Dunning, Meyerowitz, & Holzberg, 1989). Both approaches have the common feature that as they only retrieve a single estimate, a lot of information gets lost, thus leaving room for alternative explanations. Many sets of beliefs can produce the same result when aggregated in this manner; Bayesian posteriors and true overconfidence are just two of them.

We design two experiments to elicit more detailed beliefs of participants concerning a number of domains that have previously been associated with overconfidence, overoptimism, or underconfidence. Self-evaluations are given along a quantile scale that describes the ability distribution relative to a peer group. Along this scale, participants provide estimates representing their subjective probability of themselves falling into each skill quantile. The extended assessment allows us to directly test whether the findings are in line with rational information processing.

Our central result is that considerable overconfidence is present in the belief distributions of experiment participants. We test various conditions for population averages of these probability distributions and find them incompatible with rational information processing. Bayesian updating can be rejected as an explanation for apparent overconfidence at conventional significance levels. Most people find it highly probable that they rank among the higher quantiles of the ability distribution and not at all likely that they are below average. On an individual level, they often fall short of their expectations, and especially the unskilled exhibit pronounced overconfidence. We conclude that true overconfidence is the main driver of our results.

Types of overconfidence

While this is not the place to review an abundant overconfidence research in psychology and economics (consider e.g. Glaser & Weber, 2010), it is nevertheless useful to divide the field into three subareas which can be summarized following Moore and Healy (2008):

1. Judgments of one's absolute performance or ability (overestimation).
2. Confidence in the precision of one's estimates (miscalibration or overprecision).
3. Appraisal of one's relative skills and virtues (better-than-average effect or overplacement).

Overestimation is diagnosed if people's absolute evaluation of their own performance (e.g. correct answers in a knowledge test) exceeds their actual performance (Lichtenstein, Fischhoff, & Phillips, 1982; Moore & Healy, 2008). Miscalibration or overprecision denotes the observation that people choose overly narrow confidence intervals when asked for a range that is supposed to contain a true value with a certain probability (Alpert & Raiffa, 1982; Russo & Schoemaker, 1992). Overplacement often occurs when people try to evaluate their competence in a certain domain relative to others. Typically, most people rate themselves above average, which is why this effect is also called better-than-average effect (Alicke & Govorun, 2005). The relationship between these different forms of overconfidence is discussed for instance, in Glaser, Langer, and Weber (2009), Healy and Moore (2007), Larrick, Burson, and Soll (2007).

Apart from the aforementioned, overoptimism (Weinstein, 1980) and illusion of control (Langer, 1975) are associated with overconfidence in a broad interpretation of the term. We will concentrate on the better-than-average effect (overplacement) and occasionally on overoptimism, as the elicitation techniques for these biases are similar.

Criticism which has been raised against all types of overconfidence is usually directed either at research methodology and experimental design or the underlying concept itself; the list of authors in psychology who have questioned the reality of overconfidence or the research design includes Gigerenzer (1991), Gigerenzer, Hoffrage, and Kleinbölting (1991), Juslin (1994), Erev, Wallsten, and Budescu (1994), Dawes and Mulford (1996), Klayman, Soll, González-Vallejo, and Barlas (1999). In economics—where the rationality assumption was long prevalent—the emphasis was a different one: in recent years, various approaches were pursued to reconcile overconfidence with rational behavior (Bénabou & Tirole, 2002; Brocas & Carrillo, 2002; Compte & Postlewaite, 2004; Healy & Moore, 2007; Köszegi, 2006; Santos-Pinto & Sobel, 2005; Van den Steen, 2004; Zábojník, 2004). These models differ mainly in their assumptions, their relevance for different forms of overconfidence and the degree of rationality they are based on. In many ways, this literature has contributed to improving and clarifying methodology, but the debate whether overconfidence exists at all is far from being settled.

Criticism by Benoît and Dubra

The reasoning of Benoît and Dubra (2009) to some extent combines the two mentioned strands of criticism. They identify a problematic feature in the conventional procedure to demonstrate the better-than-average effect, namely relative imprecise inquiries for an appraisal of relative skills and virtues. Based on a parsimonious signaling model, they then employ rational Bayesian argumentation to illustrate that this kind of research cannot show overconfidence in the form of the better-than-average effect. We will now examine their reasoning in detail.

Probably the most prominent account of the better-than-average effect is given in Svenson (1981), who finds that a great majority of subjects rated themselves to be safer drivers than the median driver (77% of his Swedish and 87% of his US sample). He explains his findings by a general tendency of people to view themselves more favorably than they view others, possibly accompanied by cognitive effects such as low availability of negative memories. Similar results could be reproduced for other domains, for example for people evaluating their personal virtues relative to others (Alicke, Klotz, Breitenbecher, Yurak, & Vredenburg, 1995).

These overplacement studies have a common research methodology, which often simply consists of asking participants whether they view themselves as better as or worse than the median or average of a comparison group with respect to some skill or virtue. Researchers occasionally require more precise estimates, i.e. other quantiles (often percentiles or deciles) are used instead of the median. Overconfidence is usually diagnosed if significantly more than half of the participants place themselves above the median, or more generally if more than x% place themselves above the $(100 - x)$-percentile.

Some concerns regarding this design were raised earlier; for instance, people may interpret the skill in question differently or they may lack information about its distribution within the population. Additionally, the sample of participants might not be representative of the population, and the meaning of "average" can be understood in various ways. These problems can nevertheless be addressed by a more careful experimental design including precise and unambiguous formulation of questions and a fairly large and representative choice of subjects. Combined with the assumption that participants use best estimates of their own and others' abilities and skills, the general result remains valid—it seems intuitive that no more than a certain fraction of the population can rate themselves above a respective percentile.

However, Benoît and Dubra (2009) show that exactly this is possible even when people update their beliefs in a perfectly rational manner. In order to illustrate this, we shall briefly reproduce their example capitalizing on Svenson's study of driving ability here. In a uniformly distributed population of low, medium and