JOGSC
Journal of Global Science
ISSN: 2453-756X (Online) Journal homepage: http://www.jogsc.com

The Dunning-Kruger effect: a review of significant findings

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Abstract: The main goal of this article is to shed light on the so-called Dunning-Kruger effect is in fact a cluster of meta-cognitive distortions that belong to the same group as other cognitive biases. However Dunning-Kruger effect differs from the others by having a double negative effect on individual. The poor performers tend to be worse at judging the other peoples´ competences than top performers. One way to learn about one´s own incompetence is by observing the behavior of other people by using of the social comparison information. Article gives fundamental information about the current trends in approach towards meta-cognitive phenomena.

Keywords: Dunning-Kruger effect, Performance, metacognition, competences

JEL Classification: J5

Introduction

Human psyche is not always capable of understanding its own limitations when it comes to introspection of its own unknown unknowns. But a manifestation of the argument that is quite visible in everyday life could be found. Mainly - it is not the meta-ignorance people witness in themselves but rather - it is the meta-ignorance they witness among others. Specifically, for any given skill, number of people usually have more expertise and some have less, eventually there is a group that scores significantly lower or equal than 25% (the so-called "poor performers"). What about those people with low levels of expertise? Do they even recognize their reserves? According to the hypothesis presented in article, people with substantial deficits in their knowledge or expertise should not be able to recognize those deficits. In a nutshell - despite potentially making error after error, they should tend to think they are doing just fine, meaning that those who are incompetent, should have little insight into their occurring incompetence the root of an assertion that has come to be known as the Dunning–Kruger effect, (hereinafter also referred as DKE) after the famous IG Nobel prize winners justin Kruger and David Dunning (1999). This is the usual form of meta-ignorance that is visible to people in everyday life. Thus, the main question might be whether the people are truly unable to detect their own deficits even when such deficits are rather costly or negatively affecting managerial or organizational decision making processes.

1. The Dunning–Kruger effect - detection of meta-cognitive bias

Since 1999, Justin Kruger and David Dunning cooperated as partners on a chain of surveys which tend to discover the truth behind the extent to which poor performers in knowledge field reveal any insight about the true depth of their limitations and incompetent performance. The overall strategy was to ask participants to take tests assessing intellectual expertise in fields such as logical reasoning and grammar, as well as tasks that were made for assessing their social skills. In the beginning - participants (N= 141) rated how well they thought they were doing. The research has later developed in two different ways. First, examinators have asked participants to provide comparative self-evaluations, rating how well they think they are doing relative to their peers. Second variant of the original set surveyed the participants for their self-evaluations along more "absolute" scales involving no social comparison, such as estimating how many specific questions they think they are getting right on the test presented to them. Is there a mechanism that would make poor performers understand how badly they did? Kruger and Dunning (1999) predicted that they would not have such tool. The main reason for such lack of mental operation could be that similarly - as their more skilled colleagues, these poor scoring individuals would select the answers that looked the most sensible to them—and so at the end of the survey would think that their overall performance was good. Operating from incomplete and corrupted knowledge, would make many mistakes and poor performers could not recognize those mistakes as they made them.

1.1 The two problems with recognition of own mistakes

The acquired data proposed that when it came to judgments of performance based on knowledge (like grammar tests for example), poor performers usually face a double difficulty. First, deficits in their expertise would lead them to make many mistakes. Secondly, those exact same biases would lead them to be unable to recognize when they were making mistakes and when other people were choosing right answers. As a consequence, because poor performers were choosing the responses that they thought were the most reasonable, this could lead them to think they were doing quite well - when they were doing quite the opposite. This double-handicap arises because, in many life domains, the act of evaluating the correctness of one's (or anyone else's) response draws upon the exact same expertise that is necessary in choosing the correct response in the first place. The skills needed to execute the meta-cognitive task of judging the accuracy of a response (Everson and Tobias 1998; Maki and Jonas and Kallod 1994) are precisely the same as those necessarily for the cognitive task of producing an accurate response. Need to judge whether one (or someone else) has written a grammatically correct sentence? Then you should not forget that act of judgment relies on the same set of skills as the act of forming a grammatically correct sentence before. Is it possible to know for sure if one has constructed a logically sound argument? That act of evaluation depends on the exact same know-how needed to construct a sound argument. Thus, if poor performers suffer deficits in knowledge that failed them when it came time to form correct responses, those exact same deficits would similarly fail them when it came time to judge the worth of those responses. They would not know when their responses were incorrect; they would

not know when others formed better ones. Expertise and metacognitive judgment are the main tools needed for success in such cases.

1.2 Review of most significant studies in relevance with Dunning Kruger effect

Previous research has shown that strong and poor performers differ in their success at the metacognitive task of evaluating their performance. When people are asked to evaluate responses to individual test items, strong (meaning top 25%) performers anticipate better which individual items they are likely to get right versus wrong than do poor performers. Such difference in metacognitive achievement was observed in a wide range of tasks, such as: clinicians making mental illness diagnoses (Garb 1989; Levenberg 1975), pharmacy school graduates seeking licensure (Austin, Gregory and Galli 2008), students taking an exam (Shaughnessy 1979; Sinkavich 1995), readers indicating how well they comprehend a narrative passage (Maki and Berry 1984; Maki et al. 1994), Novice drivers in the Netherlands and Finland who failed their first driver's test overestimated how their examiners would rate them to a greater degree than did those who passed the test (Mynttinsen et al. 2009) bridge players indicating their best versus worst moves (Keren 1987), tennis players knowing which shots are more likely to be winners (McPherson and Thomas 1989), physics experts knowing which problems will be more difficult (Chi, Glaser and Rees 1982).

In each case, the judgments of strong performers about which individual responses would meet with success versus failure were more accurate than the judgments of their less competent peers (although Glenberg and Epstein 1987; Wagenaar and Keren 1985, came with null results in the past).

Across several studies, it has been repeatedly shown that people's top-down self-views influence their experiences with a problem solving situation, which in turn influence their impressions of objective performance. In one such study, students completed an interpersonal perception survey after rating their own " social perception ability." For each item on the test, they also described their experience in coming to an answer—such as whether they knew the answer immediately or had to go back and forth between possible answers. At the end of the test, they also indicated how many items they thought they got right. Statistical analysis later revealed that participants' *confidence in their social perception* ability significantly predicted how they rated their bottom-up experience with the task, which in turn predicted how well they thought they had objectively performed (Critcher and Dunning 2009, 931-945).

In another study, participants were asked to take two different history tests—one of the tests was designed for the high school level and one for the graduate school level. In fact, the two tests were equivalent and participants did not differ in their performance between the two tests (sheets counterbalanced across participants which exact test was given which label). However, participants held a top-down expectation that they could better handle the high school test, and described the experience of taking the high school test as more achievable and familiar (e.g., "This question deals with material I've learned before") than they did the graduate school test. As a consequence of these different "experiences," participants estimated that they performed significantly better on the high school test than they did the graduate school version (Critcher and Dunning 2009, 931-945).

A survey with several hundred engineers in two companies developed by Zenger (1992) discovered, that 32% in one company and 42% in the other thought their skill shall put them in the top 5% of performers in that company—a statistically absurd result. That bias aside, there was a statistically observable relation between perceived and actual performance ($r = .47$ and $.60$, $p < 0.01$ - for percentile and raw score estimates).

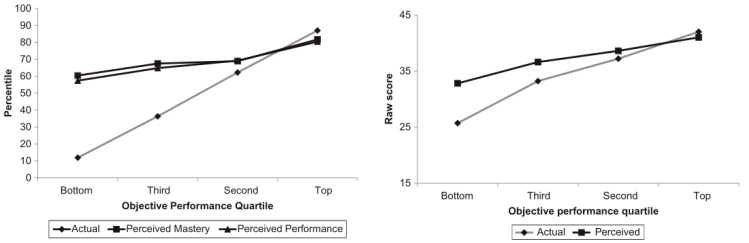
2. Practical implementations and methodology

But how would this difference between strong and poor performers translate from judgments of individual items to evaluations of overall performance? Figure 1 shows the results of one such study examining whether poor performers show any insight into the weakness of their performance. In this particular study, 141 university students who had just completed an exam in one of their college courses were asked to evaluate their "mastery of course material" as well as their performance on the specific exam they had just completed. Participants estimated their performances along percentile scales (e.g. 50-60%, 60-70% etc.) as well as they estimated the percentage of other students in the course they thought they had outperformed. They also gave permission to examinators for retrieving their actual exam score, so that we could compare their perception of their performance against the real score (Dunning et.al 2003, 83-87).

As Figure 1 clearly shows, there are many observations one can make about how well perceived performance tracks actual performance. In the figure, the participants' objective performance divided them into four groups—from bottom quartile performers up to top quartile (top 25%) performers. Whether one is talking about mastery of course material or performance on the test, respondents tended to think of their performance, on average, as anything but

average. Respondents in all four performance groups tended to think they scored above the 50th percentile, or rather the average of the class. Participants thought their mastery of course material lay in the 70th percentile and their test performance in the 68th—well above the real statistics allows. When asked to estimate their raw score, they overestimated on average by 3 points— e.g. perceiving a score of 37 versus a reality of achieving 34 ($p < 0.001$).

Figure 1 Perceived performance as a function of objective performance on a "mastery of course material" exam. Left panel presents percentile ratings for perceived mastery of course material and performance on the exam. The right panel presents perceived raw score on the exam (out of 45 points). Source: Dunning et al. 2003, 83–86.



3. Discussion

These findings support the DKE hypothesis. People typically tend to hold overly inflated views of their competence and performance—thinking on average that they are better than their peers when it is statistically impossible for a group to post, on average, "above-average" performances (Alicke and Govorun 2005; Dunning 2005; Dunning, Heath and Suls 2004; Dunning, Meyerowitz and Holzberg 1989; Weinstein 1980). We can also see similar outcomes in other studies. For example a survey across 34 countries of the math skills of 15-year-olds discovered that higher math performance was associated with more accurate self-perceptions of math skill (Chiu and Klassen 2010),

Students, who did poorly on the exam intuited that they were doing worse on the exam than those who did well. That said, although it was statistically significant, the relation was quite shallow—with bottom performers, on average, thinking they performed roughly 15–20 percentile points (8 raw score points) worse than top performers' self-judgments. This finding also supports the possible relation between what people believe about their skill and the reality as revealed by actual performance (Dunning 2005; Dunning et al. 2004; Mabe and West 1982)—whether in the doctor's office (Davis et al. 2006), classroom (Camerer and Hogarth 1999), workplace (Harris and Schaubroeck 1988; Stajkovic and Luchins 1998). Repetitiveness of occurrence of DKE leads to a shocking discovery - people in the bottom 25% of performers, whose actual performance lies deep in the 12th percentile, thought that their mastery of course material and test performance should lay close to the 60th percentile—a severe misjudgment of over 45 percentile point! If we look at their raw score estimates, we find that people at the bottom overestimated their raw performance on the test by nearly 30% (Dunning et al. 2003). This pattern of dramatic overestimation have been observed by bottom performers across a wide range of tasks - from tests of logical reasoning and grammar skills (Kruger and Dunning 1999) to more social abilities like emotional intelligence (Sheldon, Ames and Dunning 2010) one of the first tryouts even surveyed highly subjective cases like discerning which jokes are funny (Kruger and Dunning 1999). In all cases, top to bottom performers provide self-evaluations along percentile scales that largely replicate. Overestimation in real world settings is well documented as people tackle everyday tasks, such as score misjudgments of hunters taking a quiz on firearm use and safety, (quiz was based on standardized questionnaire created by the National Rifle Association), at firearms competition (Ehrlinger et al. 2008), as well as for laboratory technicians taking an exam about medical lab procedures and knowledge (Haun et al. 2000). The reactions of surveyed participants entering chess tournaments revealed that people who possess less skill, as indicated by their official rating, miss predicted their tournament performance more than those with greater skill, irrespective of previous experience with tournament chess (Park and Santos-Pinto 2010).

Top performers also tend to underestimate their performances—a finding that had been replicated across many settings. However, gathered data suggest that these misjudgments come from a different source from the misjudgments of poor performers. Essentially, bottom performers overestimate their proficiency because their intellectual deficits deprive them of the resources necessary to recognize that they are choosing incorrectly. They

make the mistake of thinking that all their choices are at least reasonable. The problem for top performers is different. They have ample resources to know when they are most likely to be right or wrong in their decisions. Because correct answers come relatively easy to them, they mistakenly believe that other people must be coming to the same correct choices. As a consequence, their own performances, albeit good, are not that special relative to how well they think other people are doing. Top performers consistently underestimate how well they perform on percentile scales, however, on objective or absolute scales (e.g., how many test items answered correctly), we see no consistent evidence of underestimation or overestimation (Ehrlinger et al. 2008).

The final outcome of this article may be the following: *self-evaluation errors of top performers were associated with a mix of mistaken impressions of both self- and peer-performance, whereas the errors of bottom performers were entirely associated with faulty impressions of self-performance.*

4. Conclusion

The main goal of this article is to shed light on the so-called Dunning-Kruger effect is in fact a cluster of meta-cognitive distortions that belong to the same group as other cognitive biases. However Dunning-Kruger effect differs from the others by having a double negative effect on individual. The poor performers tend to be worse at judging the other peoples´ competences than top performers. One way to learn about one´s own incompetence is by observing the behavior of other people by using of the social comparison information. One merely has to see when other people approach a problem differently, judge when those other approaches are superior or inferior to one´s own, and adjust self-perspective of competence accordingly. But what if one cannot reliably intuit which approaches are inferior or superior? Lastly - the experience of top performers is usually quite different. They accurately see that their peers are performing less well than they themselves are—that is, their false consensus error is corrected—and thus increase how special or distinctive they believe their own performance and skills could be. One final prediction follows from our analysis of the Dunning–Kruger effect. Luckily -there is an avenue by which bottom performers can be guided toward more accurate self-judgments. If they misjudge themselves because they do not have the intellectual resources to judge superior versus inferior performance, one has merely to provide them with those resources. Of course, this procedure leads to a paradox, in that it renders bottom performers no longer ignorant or incompetent. That is, one way to train incompetent people to recognize their incompetence is to rid them of that incompetence.

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