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A pessimistic view of optimistic belief updating

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ABSTRACT

Received academic wisdom holds that human judgment is characterized by unrealistic optimism, the tendency to underestimate the likelihood of negative events and overestimate the likelihood of positive events. With recent questions being raised over the degree to which the majority of this research genuinely demonstrates optimism, attention to possible mechanisms generating such a bias becomes ever more important. New studies have now claimed that unrealistic optimism emerges as a result of biased belief updating with distinctive neural correlates in the brain. On a behavioral level, these studies suggest that, for negative events, desirable information is incorporated into personal risk estimates to a greater degree than undesirable information (resulting in a more optimistic outlook). However, using task analyses, simulations, and experiments we demonstrate that this pattern of results is a statistical artifact. In contrast with previous work, we examined participants' use of new information with reference to the normative, Bayesian standard. Simulations reveal the fundamental difficulties that would need to be overcome by any robust test of optimistic updating. No such test presently exists, so that the best one can presently do is perform analyses with a number of techniques, all of which have important weaknesses. Applying these analyses to five experiments shows no evidence of optimistic updating. These results clarify the difficulties involved in studying

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human 'bias' and cast additional doubt over the status of optimism as a fundamental characteristic of healthy cognition.

1. Introduction

For over 30 years it has been an accepted 'fact' that humans are subject to a consistent bias when estimating personal risk. Research suggests that people underestimate their chances of experiencing negative events (with respect to their estimates of the average person's risk), and overestimate their chances of experiencing positive events (e.g., Harris & Guten, 1979; Weinstein, 1980, 1982, 1984, 1987). Hence researchers in this area have concluded that "people have an optimistic bias concerning personal risk" (Weinstein, 1989, p. 1232). This pattern of optimistic self-estimates has been termed 'unrealistic optimism', and is commonly thought to reflect a self-serving motivational bias (for a review, see Helweg-Larsen & Shepperd, 2001; but see also Chambers & Windschitl, 2004).

Unrealistic optimism has attracted a great deal of academic interest both from multiple domains within psychology (including social psychology, judgment and decision-making, and cognitive neuroscience) and from economics (see e.g., van den Steen, 2004). This research has also been used in various applied domains including clinical psychology where it has been proposed that an optimistic bias is a necessary requirement to guard against depression (see Taylor & Brown, 1988). Within health psychology, unrealistic optimism is used to explain the failure of individuals to undertake health protective behaviors (e.g., van der Velde, Hooykaas, & van der Joop, 1992; van der Velde, van der Pligt, & Hooykaas, 1994) and to resist changes in diet (Shepherd, 2002), on the grounds that personal risk estimates of obesity-related diseases are underestimated (see Miles & Scaife, 2003). Within the financial sector, unrealistic optimism has been linked to economic choice (HM Treasury Green Book, n.d.; Puri & Robinson, 2007; Sunstein, 2000) and it has been suggested as one of the factors behind the financial crisis experienced in the first decade of the 21st Century (Sharot, 2012). Most recently, attention has turned to investigating the neural correlates underlying the phenomenon (Chowdhury, Sharot, Wolfe, Düzel, & Dolan, 2014; Garrett et al., 2014; Sharot, Guitart-Masip, Korn, Chowdhury, & Dolan, 2012; Sharot, Kanai, et al., 2012; Sharot, Korn, & Dolan, 2011; Sharot, Riccardi, Raio, & Phelps, 2007; see Sharot, 2012).

1.1. Detecting optimism: the comparison method

A recent analysis, however, has cast doubt over the evidential basis for unrealistic optimism. Harris and Hahn (2011) argued that methodological and conceptual limitations of studies investigating this phenomenon mean that results may be better explained as a statistical artifact rather than unrealistic optimism (for a critique and counter-critique, see Hahn & Harris, 2014; Shepperd, Klein, Waters, & Weinstein, 2013). Harris and Hahn demonstrated that it was possible for perfectly rational (non-optimistic) agents to generate personal risk estimates that would be classified as unrealistically optimistic given the paradigms and scoring methods used in the vast majority of unrealistic optimism studies. Specifically, unrealistic optimism is usually studied by asking participants to compare (directly or indirectly) their chance of experiencing a negative life event with the chance of the average individual ('*the comparison method*'). The typical result is that, at a group level, participants' average estimates of their own risk are significantly lower than the group average. Harris and Hahn, however, showed that when the negative events are rare (i.e., have a base rate of less than 50% within the population, as is almost always the case in optimism studies), three statistical factors, namely, attenuated response scales, under-sampling of population minorities, and regressive population base rate estimates, can cause completely rational groups of agents to produce the pattern of empirical results that has been taken to indicate unrealistic optimism. This methodological failing means that the results of past studies using the comparison method (i.e., the majority of research on optimism

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