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What is unrealistic optimism?

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ABSTRACT

Here we consider the nature of unrealistic optimism and other related positive illusions. We are interested in whether cognitive states that are unrealistically optimistic are belief states, whether they are false, and whether they are epistemically irrational. We also ask to what extent unrealistically optimistic cognitive states are fixed. Based on the classic and recent empirical literature on unrealistic optimism, we offer some preliminary answers to these questions, thereby laying the foundations for answering further questions about unrealistic optimism, such as whether it has biological, psychological, or epistemic benefits.

0. Introduction

In this paper we are interested in the nature of unrealistic optimism and other positive illusions as discussed in the psychological literature. There is an ongoing debate in philosophy and psychology as to whether false beliefs are epistemically irrational and whether they can have pragmatic benefits, even if they are epistemically irrational (Bortolotti & Sullivan-Bissett, 2015; Craigie & Bortolotti, 2014; Haselton & Nettle, 2006). Beliefs exhibit epistemic irrationality to the extent that they are badly supported by the evidence available to the agent, or are maintained despite counter-evidence which is available to the agent. It is sometimes claimed that positive illusions generally, and unrealistic optimism specifically, are systematic tendencies to form beliefs that are biased, and often false, but have significant benefits (Taylor & Brown, 1988, 1994), because they increase wellbeing, contribute to mental and physical health, and support productivity and motivation (cf. Bortolotti & Antrobus, 2015).

In order to assess such claims, we need to explain what unrealistic optimism is, whether the cognitive states that are unrealistically optimistic are belief states, and to what extent they are false. If such cognitive states can be said to be false or epistemically irrational beliefs, then they are candidates for being false or epistemically irrational beliefs that are useful. Whether they do indeed have positive effects is beyond the scope of this paper.

In Section 1, we distinguish between unrealistic optimism and other positive illusions and explain different ways of operationalizing unrealistic optimism. In Section 2, we ask how we should think about positive illusions. Are they tendencies to adopt and maintain positive beliefs and to make predictions that are optimistically biased, or to express desires and hopes about the self and the future? We suggest that we should understand optimistically biased cognitive states as beliefs and predictions. In Sections 3 and 4, we consider their epistemic status. Are they typically false? Are they epistemically irrational? The answers to these questions will be informed by an analysis of the extent to which optimistically biased beliefs

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and predictions are fixed. In Section 5 we discuss two ways of understanding fixity of beliefs, i.e., whether beliefs are responsive to evidence and whether they are sensitive to life circumstances. Throughout the paper we reflect on a number of methodological challenges in the empirical study of optimism.

1. Unrealistic optimism and other positive illusions

While several other forms of positive illusions have been identified in the psychological literature (e.g., self-serving bias and wishful thinking, Krizan & Windschitl, 2009; Shepperd, Malone, & Sweeny, 2008), we will consider the following three forms: (1) the illusion of control, which is an exaggerated belief in one's capacity to control independent, external events (e.g., Langer & Roth, 1975); (2) the better than average effect (sometimes also called the superiority illusion), which is the perception of oneself, one's past behaviour, and one's lasting features as more positive than is the case ("I am more talented than the average person") (e.g., Brown, 2012); (3) unrealistic optimism, which is the "tendency for people to believe that they are less likely to experience negative events and more likely to experience positive events than are other people" (Shepperd, Carroll, Grace, & Terry, 2002, p. 65). In our paper, we use the expressions 'unrealistic optimism' and 'optimism bias' interchangeably, which is common practice in the literature.

Here are some examples of positive illusions. Instances of the illusion of control can be found in a casino, where people tend to think that they have a better chance at winning when they are the ones rolling the dice, and thus they bet more money in those circumstances (Vyse, 1997). An example of the better-than-average effect is when college professors are asked whether they do above-average work, and 94% of them say they do (Cross, 1977). They cannot all be right about that. An example of the optimism bias is when people underestimate the likelihood that their marriage will end in divorce or that they will develop a serious health condition during their lives (Weinstein, 1980).

There are a number of different phenomena which are normally grouped under the heading 'optimism bias'. Shepperd, Klein, Waters, and Weinstein (2013) distinguish between unrealistic comparative optimism, and unrealistic absolute optimism. On the former definition, people evaluate their own prospects as better than those of similar others (or another specific reference group), in other words, they expect that positive outcomes are more likely and negative outcomes are less likely to occur for oneself than for others. On the latter definition, people's risk assessment is unrealistically positive when compared to an objective criterion, such as an actuarial risk assessment or actual outcomes (e.g., a grade at the end of a college course). These forms of optimism bias need to be distinguished from dispositional optimism. Dispositional optimism is conceptualized as a personality trait, which people exhibit to different degrees. Broadly defined, it is a generalized tendency to expect positive outcomes (Carver, Scheier, & Segerstrom, 2010). This expectation need not be unrealistic, and the Life Orientation Test measures a generally positive outlook which does not include predictions regarding specific life-events (Scheier, Carver, & Bridges, 1994).

All three positive illusions are taken to give rise to beliefs that are badly supported by the evidence and that leave the person with a more positive outlook than is warranted. These positive illusions can interact with one another. For instance, an unrealistically positive view of the quality of one's research is also likely to lead to unrealistic expectations regarding the likelihood of one's research being published. Similarly, if a person believes that they can control events more than they can in fact, this belief will lead them to be more optimistic about their chances of avoiding undesirable outcomes and achieving desirable ones (McKenna, 1993; Shepperd et al., 2002).

2. Are positive illusions beliefs?

What is the status of the assertions research participants make in the positive illusions literature? Are they statements about what people think of themselves and about what they think will happen? Are they mere expressions of hope or desire, or guesses about what could happen? Taylor defines positive illusions as "enduring patterns of beliefs" about self, world, and future (1989, p. 44), and as "systematic small distortions of reality that make things appear better than they are" (1989, p. 228). Based on Taylor's account of positive illusions, in this paper we understand positive illusions as systematic tendencies either to adopt and maintain excessively optimistic beliefs about the self or to make excessively optimistic predictions about the self, where we understand predictions as beliefs about what will happen or what is likely to happen. This understanding of positive illusions as patterns of beliefs is largely shared in the psychological literature, and compatible with common assumptions about how positive illusions work (cf. Collard, Cummins, & Fuller-Tyskiewicz, 2016; Makridakis & Moleskis, 2015; McKay & Dennett, 2009).

As with other cognitive states that are likely to be biased, illusory, or simply badly supported by the evidence, such as self-deception, prejudice, superstition, and delusion, there is some debate about the status of the cognitive states studied in the positive illusions literature (Flanagan, 2009), and often positive illusions are described as things people just hope for in the context of health (e.g., Paley, 2014) or relationships (e.g., Murray, Holmes, & Griffin, 1996). Some of the methodological challenges to the positive illusions approach imply that the participants' reports are expressions of their desires or hopes for positive outcomes, and thus are not subject to an assessment of rationality in the same way as beliefs would be.

People can have different attitudes towards the same propositional content. For instance, take the content "Mary won't get a divorce". Mary can believe that she won't get a divorce. In this first case, Mary is committed to the truth of "Mary won't get a divorce", and, if she is a rational believer, her commitment should be guided by her weighing up the evidence for and

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against the content of her belief. Mary can also desire that she won't get a divorce. In this second case, Mary wants the world to be such that she won't get a divorce but she is committed neither to the truth nor to the possibility of what she desires. Mary can hope that she won't get a divorce. In this third case, Mary is committed to it being a good thing and it being possible that she won't get a divorce, but she is not committed to its being true that she won't get a divorce. Believing, desiring, and hoping are what philosophers call "propositional attitudes", that is, attitudes people can take to a propositional content.

One suggestion in the literature on positive illusions is that people have a desire or a hope that they are better than average, or that positive things will happen to them, but are not genuinely committed to the truth of those contents (Flanagan, 2009; Frankish, 2009). The claim is that, when people assess whether they are better than average in some domain or assess their likelihood of getting a divorce, they reply by expressing something they desire or hope, not something they believe. On this reading, such an optimistic outlook is not necessarily biased or illusory.

The so-called 'optimism bias' seems to be even better suited to this reading than the better than average effect, given its future orientation. When people say that they will not develop cancer in the course of their lives, are they expressing a belief in how their future will be, or a hope? Flanagan (2009) has argued that positive illusions should be seen as "can do attitudes" or hopes as opposed to false beliefs or misbeliefs. Flanagan argues that to desire or hope for something that conflicts with evidence, and thus is unrealistic, can be beneficial, especially if it leads to positive affect or self-improvement. But to believe something that conflicts with evidence can lead to a distorted picture of reality and have bad psychological consequences.

The attractiveness of this position is that it makes one counter-intuitive claim of the positive illusions literature disappear. The counter-intuitive claim is that a set of beliefs or predictions that are biased, illusory, or not based on evidence (and thus *epistemically* bad) can nonetheless be beneficial (and thus *psychologically* good). If research participants in the positive illusions literature did express desires or hopes rather than beliefs, both the key claims defended by Taylor and Brown (1988) would be challenged, (i) that illusory beliefs about the self and one's future are very common in the non-clinical population; and that (ii) such illusory beliefs are beneficial. Taylor and Brown should have said instead that (i$*$) optimistic desires and hopes are very widespread in the non-clinical population; and that (ii$*$) such desires and hopes have benefits. As a result, their theses would have been much less controversial.

The problem with this view is that the statements of research participants in the positive illusions literature are expressed, defended, and acted upon in the same way as beliefs would be. For instance, they lead to action. In contexts as different as gambling, trading in the stock market, starting a new firm, and initiating a war (Makridakis & Moleskis, 2015), people appear to rely on their predictions, and this reliance on excessively optimistic predictions turns out to be very costly. Anecdotal evidence and personal experience also provide examples: people assume that their relationships will last, thus arranging for prenuptial agreements that will negatively affect them in the case of a divorce, or take it for granted they will not be affected by a serious disease and thus do not get health insurance. Although desires and hopes can influence action to a significant extent, the connection between desire or hope and action is different from, and often less direct than, the connection between belief and action because only belief carries a commitment to the truth of its content (Bishop, 2016; Schroeder, 2015).

Although it may be methodologically difficult to distinguish beliefs from desires based on people's statements in an empirical study, we have no good reason to rule out that people believe what they state in the positive illusions literature. After all, beliefs are not always backed up by evidence and are often unresponsive to new evidence (Bortolotti, 2009; Cialdini, Petty, & Cacioppo, 1981; Hovland, Janis, & Kelley, 1953). Agents are not ideally rational in the way they adopt and maintain their beliefs, due to a combination of cognitive limitations and motivational factors.

3. When is optimism unrealistic?

In Section 2 we saw that in the literature unrealistically optimistic attitudes are commonly viewed as biased or illusory beliefs. But what makes them unrealistic?

3.1. Some methodological considerations

Several researchers (Colvin & Block, 1994; Colvin, Block, & Funder, 1995; Flanagan, 2009; Young, 2014) have expressed concerns about the methodology adopted in establishing the existence and pervasiveness of positive illusions in the non-clinical population, and the contributions of such illusions to psychological adjustment and mental health (Taylor & Brown, 1988). Are so-called positive 'illusions' really illusory? While this question may arise for other positive illusions as well (when Estelle thinks she is a good friend, she may just have an idiosyncratic understanding of what makes a person a good friend), it is particularly difficult to answer when we are looking at predictions regarding the future. Scientists who aim to show that certain optimistic or self-enhancing beliefs are unwarranted or false face a number of methodological and epistemological problems in establishing falsity in specific cases of optimistically biased belief. The method for assessing whether a belief is unrealistically optimistic also depends on whether researchers are measuring absolute or comparative unrealistic optimism (see Shepperd et al., 2013).

In the case of absolute unrealistic optimism, a prediction is unrealistically positive compared to the objective likelihood of an event occurring. In contrast, in comparative unrealistic optimism, people are unrealistically optimistic about their chances compared to those of others. So the error the individual is making is a different one. The absolutely unrealistic

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individual is mistaken about their objective risk, or their actuarial risk assessment, whereas the comparatively optimistic individual is unrealistic about their risk relative to that of others.

Not only are the presence of unrealistic comparative optimism and unrealistic absolute optimism established in different ways, but these two forms of optimism may be uncorrelated. A person may exhibit unrealistic comparative optimism and unrealistic absolute pessimism (or vice versa) at the same time.[1] For example, a woman may believe that she is less likely than other women to get breast cancer, while at the same time overestimating her risk relative to the estimate suggested by some objective indicator, such as a risk calculator. Clearly, there are also possible scenarios where an individual exhibits comparative unrealistic optimism and absolute realism or comparative realism and absolute unrealistic optimism. Depending on the case and the kind of unrealistic optimism exhibited, people are mistaken about different things and commit different errors.

Most frequently, studies look at comparative and absolute unrealistic optimism at the group level (Shepperd, Pogge, & Howell, this issue; Shepperd et al., 2013). Establishing that some of the participants must be overly optimistic in their assessment is reasonably easy to do (though see Hahn & Harris, 2014; Harris & Hahn, 2011). For example, when 70% of the population take themselves to be less likely to be divorced than the average person, they cannot all be correct. In contrast, it is not possible to establish whether a specific individual is unrealistically optimistic when one doesn't have access to the individual's objective or actuarial risk (Shepperd et al., 2013).

While it is difficult to be certain when an individual has unrealistically optimistic beliefs, it is possible to assess whether an individual *updates* her beliefs in an optimistically biased manner. A systematically distorted *belief updating* that takes into account desirable news to a greater extent than undesirable news, is one mechanism that allows individuals to maintain or arrive at unrealistically positive beliefs in the face of disconfirming evidence. In a paradigm introduced by Sharot, Korn, and Dolan (2011), people are asked to provide risk estimates for negative future events, are confronted with base rates for these events and are later asked for an estimate of their own risk again. It has been shown that when people update their initial risk estimates, they tend to incorporate desirable base rate information (i.e., information that risks are lower than expected) to a greater extent than undesirable information (i.e., information that risks are higher than expected). Importantly, according to formal learning theories, the amount of belief updating should depend on the size of the error, i.e., the difference between the expected and the actual outcome, and not on how desirable or undesirable this error was (Schultz, Dayan, & Montague, 1997). Thus, the asymmetric reliance on new information dependent on its valence results in larger updates after good news than after bad news, therefore representing a biased learning and supporting the most favorable future outlooks. In a modification of this paradigm, Kuzmanovic, Jefferson, and Vogeley (2015, 2016) have also shown that individuals show this asymmetric update pattern to a larger extent for themselves than for similar others. Moreover, given that the extent of the asymmetric updating (i.e., the difference between mean updates after good and bad news) can be computed for each single individual, this approach allows to assess optimism bias at the individual level.

But here too there are methodological problems, because unless we know what base rate a person expected at the beginning, we do not know whether the base rate information they are subsequently given constitutes positive or negative information in their eyes (Shah, Harris, Bird, Catmur, & Hahn, 2016). So, for example, if John thinks that the population base rate for heart attacks is 25% and that because of family history, his own likelihood is 35%, then the information that the base rate is 30% is not desirable information, even though it may look that way when we only compare the risk assessment John made for himself and the base rate he was then provided with.[2] If, on the other hand, John thinks he has a risk of 35% but that the population base rate is 40%, then hearing that the base rate is 35% is welcome news, even though it will look neutral when we just look at the John's risk estimate and the base rate he was provided with. In a recent study by Kuzmanovic and Rigoux (unpublished manuscript), they controlled for this effect by asking people to estimate population base rates at the beginning of each experimental trial. After that, people estimated their own risk and were then presented with the true population base rate. This procedure ensured a valid assessment of the desirability of the presented base rates, as it was defined according to the difference between the estimated base rate and the presented base rate, and not to the difference between the estimated own risk and the presented base rate. Even after increasing the transparency of how individuals perceive the presented base rates, they still demonstrated the optimism bias in belief updating as they made larger updates after desirable than after undesirable information (the same result has also been revealed by Garrett & Sharot, accepted for publication). The asymmetric use of information which is particularly pronounced for predictions regarding oneself provides reasons to think that at least some of the beliefs resulting from such update processes will be false, as the differential use of information should naturally lead to a biased estimate of one's own prospects.

3.2. Optimistic predictions, positive outcomes, and falsity

Sometimes, there can be confusion as to what exactly is required for an optimistic prediction to be false. Specifically, the question which arises is whether a positive outcome justifies the optimistic prediction post-hoc, making it a true belief. Some deny that an optimistic belief in one's success can be false if one ends up being successful after all.

[1] We thank James Shepperd for drawing this point to our attention.

[2] The example of heart attack may be considered problematic because the term heart attack is imprecise, which leads to imprecise the statistics. However, for the purposes of explaining our point, the actual data are not significant, rather the relation between the (fictional) numbers in the example is.

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"For example, if a basketball team believes that it can beat a statistically better team, and this optimistic belief leads them to beat the statistically better team, then their belief was not false."

[(Young, 2014, p. 550)]

It is true that in the case of some optimistic predictions, their truth or falsity can only be established post hoc. If a student believes that she is going to finish in the top 10 percent of her class, this may be objectively unlikely, but only time will tell whether this prediction was correct or not.[3]

But matters are different when people predict the likelihood of an event occurring in terms of a numerical risk estimate. If an event is classified as highly unlikely, the fact that it later occurs does not disprove the judgment that it was highly unlikely. This can be explained with a very simple example: If Liam mistakenly thinks that on a fair dice he has a 1 in 2 chance of throwing a 6, this estimate is not vindicated if he does throw a 6. A positive outcome does not change the fact that the odds of that outcome were low. In other words, it is possible for graded probabilities to be accurate irrespective of the actual outcome. In contrast, if his expectation was that he would roll a 6, this would turn out to be correct if he did roll a six. Another way of seeing that risk estimates which specify probabilities are different from predictions which say that a certain outcome will occur, is the following: If risk estimates could be proved or disproved by subsequent outcomes, then any risk estimate which isn't either 0 or 1 will automatically be incorrect, it is just impossible to say whether the error lay in being too optimistic or pessimistic before the actual outcome ensues.

But in contrast to the dice throwing scenario, it is much harder to calculate the objective likelihood of most life events. Matters are further complicated by the fact that there is a real possibility that, in some areas of life, the thought that a result is achievable makes it more likely that it is in fact achieved. If Timothy had an actuarial risk assessment that placed his likelihood of suffering from a heart-attack at 60%, and he himself estimated it at 30% and lived out his life happily without any heart attacks, it is both possible that the actuarial risk assessment could have been improved by taking further factors into account, or that Timothy was unrealistically optimistic in his estimate. Importantly, he may have been unrealistically optimistic even if his positive beliefs had a beneficial effect on his stress-levels and therefore partially contributed to the fact that he did not have a heart-attack. It may therefore be possible that a belief is both unrealistically optimistic, because it underestimates the chance of a heart attack, and also contributes to the undesirable event not occurring. (So, it could shift his likelihood of suffering an attack from 60% to 50%. This is still higher than his estimate, but lower than it would have been if he hadn't had the belief. Clearly, this is only a toy example to show what could in principle be the case.)

As we have seen, in many cases, it is not easy to assess predictions for their accuracy. In contrast, it is easier to make a case for the claim that an optimistically biased belief regarding the future is badly supported by the evidence. We can say that given the information Timothy had about the risk factors for heart attacks, he had no good reason to assume such a low likelihood of suffering from heart-attack.

In conclusion, there are a number of complications in establishing whether any given prediction is in fact incorrect: this may sometimes not be apparent until the actual outcome has occurred, and in other cases we may never know, because we do not know how good the actuarial risk estimate was, especially if someone beats the odds. Furthermore, and relatedly, one and the same prediction can be optimistic, realistic of pessimistic depending on the criterion used to evaluate the estimate. This has clear implications for research on the consequences of unrealistic optimism, as any statements regarding the consequences of unrealistic optimism need to establish whether unrealistic optimism was present in the first place (Shepperd et al., this issue).

4. Are optimistically biased beliefs irrational?

False beliefs and inaccurate predictions, no matter how they were formed, misrepresent how the world is or is going to be. Epistemically irrational beliefs and predictions can be either true or false, but what makes them irrational is that they were not formed on the basis of (sufficiently robust) evidence or are insufficiently responsive to evidence after being adopted.

Given this distinction between truth and rationality, falsity or inaccuracy is a red herring when we look at specific beliefs and predictions. Surely, what primarily makes these cognitive states problematic is the worry that they are epistemically irrational. Optimistically biased beliefs and predictions can be true or accurate by luck, and still count as irrational. Alternatively, beliefs can be rational, and still happen to be false or inaccurate.

Of course, the fact that people make unrealistically optimistic predictions does not in and of itself tell us anything about the reasoning processes which led to comparative or absolute unrealistic optimism. In some cases, people may exhibit unrealistic absolute optimism because they lack information or have misleading information. Thus, the question becomes whether the way we *acquire or maintain* unrealistically optimistic beliefs exhibits irrationality.

Regarding comparative optimism, one might argue that we should expect judgments about the self and judgments about others to diverge, as people are in a very different epistemic situation regarding themselves and the 'average other', and thus a difference in their reasoning is to be expected. One tends to have more detailed information about oneself than about others, let alone the average other, and this may be an important factor underlying optimistically biased beliefs (Chambers, Windschid, & Suls, 2003; Shepperd et al., 2002). This asymmetry of information concerns both one's own history

[3] Alternatively, we may deny that future contingents have a truth value at the time they are made. We will disregard this problem here.

and habits but also intentions and plans. Egocentric thinking skews people's risk estimates because they have a lot of information about the factors that affect their personal risk, but not the same amount of information about others. So, for example, Victor knows that he does not smoke and goes running regularly, and that this reduces his risk of heart attacks. He does not have the same rich body of information about others, for example, he may not know how his running habits compare to that of others of his age and socio-economic class, so he may give undue weight to this personal information when making risk assessments.

However, there is a question to what extent egocentric thinking, too, is irrational, because it unjustifiably ignores the extent to which the things we take to be special about ourselves also apply to others. For example, some authors have argued that people overestimate the importance of their intentions and the amount of control they have relative to others, and that this is in part what underlies unrealistically optimistic expectations for the future (cf. McKenna, 1993; Pronin & Kugler, 2010; Shepperd et al., 2002). In as far as there are other unjustified or ill-considered beliefs underlying optimistic predictions, these inherit the irrationality.

In addition, there is evidence that unrealistic optimism is a form of motivated cognition in the sense that people process information that is available to them in a way that favors a certain kind of subjectively desirable conclusion (cf. Hughes & Zaki, 2015). Where it can be shown that it is the desirability of certain evidence rather than its availability that influences a reasoning process, and that available evidence is neglected when it is undesirable, we are faced with instances of epistemic irrationality. It appears that such a filtering of information by desirability is what is at work in the cases of selective belief updating we considered earlier. In these cases, people favor certain evidence in order to 'justify' the desired belief (Sharot & Garrett, 2016).

As was explained in the previous section, people make different uses of base rate information in estimating risks for themselves than they do when they estimate risks for others, and they ignore undesirable base rate information when updating beliefs regarding themselves to a larger extent than they do for others. While we may explain the initial base rate neglect as the result of egocentric thinking, this cannot be the explanation for asymmetric updating. Take the example where individuals are asked to provide a base rate estimate as well as a risk estimate for themselves before being given new base rate information and being asked to update (Kuzmanovic & Rigoux, unpublished manuscript). If an individual already committed themselves to a relation between their own risk and the base rate, egocentric thinking should have been factored in at this stage. While people may have reasons to think that the base rate is not of great relevance to them (for instance because they think they are different from the average), this should manifest itself in a *symmetric* use of desirable and undesirable base rate information in belief updating (provided that the perceived difference to the average is similar across the events with desirable and undesirable base rates). Moreover, using the Bayesian theorem as a normative benchmark for rational belief updating, it could be shown that participants' optimism bias was truly irrational, and that their updates deviated more from fully rational ones after bad than after good news (Kuzmanovic & Rigoux, unpublished manuscript). Asymmetric use of information when new base rates are introduced suggests that individuals take on board the information that supports the desired outlook. This interpretation is corroborated by recent findings from neuroimaging studies. Kuzmanovic, Jefferson, and Vogeley (2016) were able to provide empirical support for the hypothesis that the positive value of optimistically biased belief updates is tracked by the same neural regions that also track the value of rewards. They demonstrated that the activity in one of the central nodes of the human reward circuitry associated with the processing of positive value (ventromedial prefrontal cortex) was increased both during greater belief updating in response to favorable information, and during not-updating or low updating in reaction to unfavorable information. While these data from belief updating do not comprehensively prove that unrealistically optimistic beliefs are generally irrational, they provide evidence for irrationality because there is an element of motivationally driven distortion of the evidence. This tendency to take on board welcome information and ignore unwelcome information also manifests itself in other areas of self-enhancing belief, such as assessments of one's own attractiveness and intelligence (cf. Eil & Rao, 2011).

To recap, it is frequently hard to say whether specific unrealistically optimistic predictions are epistemically irrational. Whether a person is epistemically irrational in her unrealistic optimism will depend on the specifics of the case. One important factor is the information that is available to that person prior to her making a judgement or a prediction. In some cases, the self-assessment or the self-related prediction is justified on the basis of the evidence at hand. However, we have argued that in as far as unrealistically optimistic predictions are maintained by an asymmetric use of desirable and undesirable evidence, they are irrational.

5. Are unrealistically optimistic predictions fixed?

We have seen that the optimism bias is pervasive phenomenon. But are unrealistically optimistic beliefs fixed? The answer to this question will depend on the notion of fixity we adopt. Here we shall consider two senses of fixity: beliefs can be fixed when they lack responsiveness to evidence or when they are not sensitive to changes in a person's life circumstances.

Let us start with responsiveness to evidence. There is some controversy in the literature as to the extent to which positive illusions can be revised when counterevidence becomes available. To some extent, optimistic beliefs are sensitive to evidence. It has been shown that some forms of optimism and self-enhancement can be reduced or at least controlled by providing people with more information and making them more accountable for the accuracy of their predictions (e.g., Barberia,

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Blanco, Cubillas, & Matute, 2013; Sedikides, Campbell, Reeder, & Elliot, 2002; Weinstein, 1980). For instance, Sedikides argues that via introspective reflection people can control self-enhancing beliefs at least in the short-term, and that self-assessment is more accurate when people are held accountable for it (Sedikides, Horton, & Gregg, 2007). Controlling or reducing self-enhancement and making self-assessment more realistic are likely to translate into more accurate predictions, that is, predictions that do not assume that one is able to influence external events and that one is better than average (more talented, smarter, healthier, trust-worthy as a romantic partner, etc.).

Another example comes from the literature on causal illusions. Causal illusions occur when people mistakenly believe that one event caused another just because they experienced them in close temporal succession (Matute et al., 2015). Causal illusions are pervasive and usually inflate people's sense of control over external events. Matute and colleagues show that there are educational interventions that can be efficacious in reducing causal illusions. Beliefs caused by causal illusions can be challenged when people are provided with details of an alternative cause for the same outcome. For instance, if a group of people who rely on agriculture for their food and have only a superficial understanding of the weather notice that a dance is followed by rain, they may come to believe that the dance was instrumental in bringing about the rain. This may be the beginning of a superstitious belief in the effectiveness of rain dances. When the group acquires a better scientific understanding of the weather and its causes, they may realise that their dance has no effect on the weather, and the causal illusion may disappear. Examples such as these suggest that beliefs due to causal illusions are resistant to counterevidence but can be revised. Often causal illusions are the basis for inaccurate predictions, and thus eliminating such illusions may also help get rid of some instances of optimism bias.

Taylor makes the explicit claim that optimistically biased beliefs are not as fixed as delusional beliefs are, but are flexible and can be adjusted (Taylor, 1989). As we saw, people are known to update their self-related predictions in the light of new evidence, but they tend to do so to a greater extent when the new information is desirable and indicates that their previous estimates were pessimistic. Moreover, people tend to be more optimistic about events that they know they can partially control, and less optimistic just before receiving outcome feedback (Sweeny, Carroll, & Shepperd, 2006). While they may give up their optimistic predictions in order to brace for bad news, people also tend to avoid situations that would cause disappointment, that is, situations in which their optimistic beliefs and predictions could be easily disproved (Armor & Taylor, 1998; Neff & Geers, 2013). Although this is evidence of some flexibility in the optimism bias, it does not support the claim that people are responsive to evidence in an epistemically rational way when it comes to their optimistically biased beliefs and predictions. Rather, the hypothesis is that optimism is strategically enhanced when fewer opportunities for it to be disconfirmed are available.

Thus, responsiveness to counterevidence seems to be a feature of optimistically biased beliefs only in some contexts, and the way beliefs are updated remains hostage to cognitive and motivational biases. It is easier to make a case for the optimism bias and other positive illusions being sensitive to life circumstances. People tend to be less optimistic about experiencing a negative event in the future if they have already experienced it in the past (cf. Campbell, Greenauer, Macaluso, & End, 2007; Shepperd, Helweg-Larsen, & Ortega, 2003). For example, children of divorced parents are more likely to accurately predict the likelihood of divorce (Franklin, Janoff-Bulman, & Roberts, 1990). More generally, positive illusions are very strong in young people with relatively happy childhoods (Carr, 2011, p. 89), especially if their parents adopted an optimistic explanatory style for external events, and attributed positive outcomes to internal and stable features of their children. It has been argued that positive illusions are hardwired due to their significant biological adaptiveness (McKay & Dennett, 2009), but they can also be fostered by a parenting style that is warm and supportive (Peterson, 2000), reduced in children with depressed parents, or seriously compromised by "child abuse and neglect" (Carr, 2011, p. 92).

Such fluctuations are common later in life as well, and are also largely dependent on circumstances. There is evidence that unrealistic optimism is higher in childhood and old age but lower in middle age (Moutsiana et al., 2013), negatively correlating with stress and positively correlating with subjective wellbeing. People tend to be more optimistic in safe environments, but when it becomes important to identify threats and danger, they are more prone to updating beliefs in the face of negative information. Indeed, it has been shown that people who are stressed learn better from negative information (Garrett et al., Unpublished results).

In people who experience low mood and are prone to depressive symptoms, self-related judgements and predictions are more realistic, at least in some domains. In this population there is a lower vulnerability to positive illusions in general (Garrett et al., 2014; Korn, Sharot, Walter, Heekeren, & Dolan, 2014; Young, 2014), which also affect the realism of self-related predictions (but see Dunning & Story, 1991). But even in people who do not experience low moods or depression, a loss of positive illusions is experienced when adversities strike. People who become victims of abuse or suffer trauma, and their care-givers, become (temporarily) less optimistic in their self-related beliefs and predictions ("Bad things really happen, and I cannot do anything to avoid them") (Bloom, 2003). This suggests that life circumstances can have an effect on whether and to what extent the optimism bias and other positive illusions are manifested.

6. Conclusion

In this paper we attempted to shed light on the extent to which unrealistic optimism and other positive illusions are belief-like, false or inaccurate, epistemically irrational, and fixed.

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We suggested that there is no reason to rule out that optimistically biased cognitive states are beliefs as opposed to desires or hopes. Optimistically biased beliefs and predictions share the features of other types of beliefs and predictions, and lead people to act in the way we would expect if people were genuinely committed to their content being true.

When it comes to the illusory nature of unrealistic optimism and the other positive illusions, there are important methodological difficulties that need to be addressed. Nevertheless, the evidence suggests that these beliefs are in many cases genuinely unrealistic and do not merely constitute positive expectations. They also exhibit features of irrationality, because they seem to be formed and upheld by a use of information that is less than rational. In some cases, people give undue weight to knowledge of their own plans and intentions, in others they take on board desirable information while neglecting undesirable information.

One aspect of the epistemic irrationality of optimistically biased beliefs and predictions is the fact that their responsiveness to counter-evidence is limited. But such beliefs are not fixed as people's predictions are affected by experience with the events they predict. Also, some interventions are successful in reducing self-enhancement in self-related beliefs (Sedikides et al., 2007), and in disclosing illusory nature of some causal relations among events (Matute et al., 2015), which are the basis for unrealistically optimistic predictions. Finally, unrealistic optimism fluctuates with developmental stages and life circumstances, being more prominent in happy childhoods and old age, and temporarily disappearing after trauma, abuse, victimisation, and other adversities.

We hope that the issues discussed in the paper help clarify the nature of unrealistic optimism, and are highly optimistic that they will also be relevant to future investigations of its adaptiveness.

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References

Armor, D. A., & Taylor, S. E. (1998). Situated optimism: Specific outcome expectancies and self-regulation. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (pp. 309–379). New York: Academic Press.

Barberia, I., Blanco, F., Cubillas, C. P., & Matute, H. (2013). Implementation and assessment of an intervention to debias adolescents against causal illusions. *PLoS ONE, 8*(8), e71303.

Bishop, J. (2016). Faith. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy*. URL = <http://plato.stanford.edu/archives/sum2016/entries/faith/>. Accessed October 5th 2016.

Bloom, S. (2003). Caring for the caregiver: Avoiding and treating vicarious victimization. In A. P. Giardino, E. M. Datner, & J. B. Asher (Eds.), *Sexual assault: Victimization across the life span* (pp. 459–470). St Louis: G.W. Medical Publishing.

Bortolotti, L. (2009). *Delusions and other irrational beliefs*. Oxford: Oxford University Press.

Bortolotti, L., & Antrobus, M. (2015). Costs and benefits of realism and optimism. *Current Opinion in Psychiatry, 28*(2), 194–198.

Bortolotti, L., & Sullivan-Bissett, E. (2015). Costs and benefits of imperfect cognitions. *Consciousness and Cognition, 33*, 487–489.

Brown, J. D. (2012). Understanding the better than average effect: motives (still) matter. *Personality and Social Psychology Bulletin, 38*(2), 209–219.

Campbell, J., Greenauer, N., Macaluso, K., & End, C. (2007). Unrealistic optimism in internet events. *Computers in Human Behavior, 23*(3), 1273–1284.

Carr, A. (2011). *Positive psychology: The science of happiness and human strengths*. East Sussex, New York: Routledge.

Carver, C. S., Scheier, M. F., & Segerstrom, S. C. (2010). Optimism. *Clinical Psychology Review, 30*(7), 879–889.

Chambers, J. R., Windschid, P. D., & Suls, J. (2003). Egocentrism, event frequency, and comparative optimism: When what happens frequently is "more likely to happen to me". *Personality and Social Psychology Bulletin, 29*(11), 1343–1356.

Cialdini, R. B., Petty, R. E., & Cacioppo, J. T. (1981). Attitude and attitude-change. *Annual Review of Psychology, 32*, 357–404.

Collard, J. J., Cummins, R. A., & Fuller-Tyskiewicz, M. (2016). Measurement of positive irrational beliefs (positive cognitive illusions). *Journal of Happiness Studies, 17*(3), 1069–1088.

Colvin, C. R., & Block, J. (1994). Do positive illusions foster mental-health – An examination of the Taylor and brown formulation. *Psychological Bulletin, 116*(1), 3–20.

Colvin, C. R., Block, J., & Funder, D. C. (1995). Overly positive self-evaluations and personality: Negative implications for mental health. *Journal of Personality and Social Psychology, 68*(6), 1152–1162.

Craigie, J., & Bortolotti, L. (2014). Rationality, diagnosis, and patient autonomy in psychiatry. In J. Z. Sadler, W. Fulford, & C. W. van Staden (Eds.), *Oxford handbook of psychiatric ethics*. Oxford: Oxford University Press.

Cross, K. P. (1977). Not can, but will college-teaching be improved. *New Directions for Higher Education, 17*, 1–15.

Dunning, D., & Story, A. L. (1991). Depression, realism, and the overconfidence effect: Are the sadder wiser when predicting future actions and events? *Journal of Personality and Social Psychology, 61*(4), 521–532.

Eil, D., & Rao, J. M. (2011). The good news-bad news effect: Asymmetric processing of objective information about yourself. *American Economic Journal-Microeconomics, 3*(2), 114–138.

Flanagan, O. (2009). "Can do" attitudes: Some positive illusions are not misbeliefs. *Behavioral and Brain Sciences, 32*(6), 519–520.

Frankish, K. (2009). Adaptive misbelief or judicious pragmatic acceptance? *Behavioral and Brain Sciences, 32*(6), 520–521.

Franklin, K. M., Janoff-Bulman, R., & Roberts, J. E. (1990). Long-term impact of parental divorce on optimism and trust: Changes in general assumptions or narrow beliefs? *Journal of Personality and Social Psychology, 59*(4), 743–755.

Garrett, N., González-Garzón, A. M., Foulkes, L., Levita, L., & Sharot, T. (Unpublished results). The optimism bias fluctuates in response to changes in the environment.

Garrett, N., & Sharot, T. (accepted for publication). Optimistic update bias holds firm: Three tests of robustness following Shah et al. *Consciousness and Cognition*.
Garrett, N., Sharot, T., Faulkner, P., Korn, C. W., Roiser, J. P., & Dolan, R. J. (2014). Losing the rose tinted glasses: Neural substrates of unbiased belief updating in depression. *Frontiers in Human Neuroscience, 8*.
Hahn, U., & Harris, A. J. L. (2014). What does it mean to be biased: Motivated reasoning and rationality. In H. R. Brian (Ed.), *Psychology of learning and motivation* (pp. 41–102). Academic Press.
Harris, A. J. L., & Hahn, U. (2011). Unrealistic optimism about future life events: A cautionary note. *Psychological Review, 118*(1), 135–154.
Haselton, M. G., & Nettle, D. (2006). The paranoid optimist: An integrative evolutionary model of cognitive biases. *Personality and Social Psychology Review, 10*(1), 47–66.
Hovland, C. I., Janis, I. L., & Kelley, H. H. (1953). *Communication and persuasion: Psychological studies of opinion change*. New Haven, CT, US: Yale University Press.
Hughes, B. L., & Zaki, J. (2015). The neuroscience of motivated cognition. *Trends Cognitive Science, 19*(2), 62–64.
Korn, C. W., Sharot, T., Walter, H., Heekeren, H. R., & Dolan, R. J. (2014). Depression is related to an absence of optimistically biased belief updating about future life events. *Psychological Medicine, 44*(3), 579–592.
Krizan, Z., & Windschitl, P. D. (2009). Wishful thinking about the future: does desire impact optimism. *Social and Personality Psychology Compass, 3*, 227–243.
Kuzmanovic, B., & Rigoux, L. (unpublished manuscript). Optimistic belief updating deviates from bayesian learning.
Kuzmanovic, B., Jefferson, A., & Vogeley, K. (2015). Self-specific optimism bias in belief updating is associated with high trait optimism. *Journal of Behavioral Decision Making, 28*(3), 281–293.
Kuzmanovic, B., Jefferson, A., & Vogeley, K. (2016). The role of the neural reward circuitry in self-referential optimistic belief updates. *Neuroimage, 133*, 151–162.
Langer, E. J., & Roth, J. (1975). Heads I win, tails its chance – Illusion of control as a function of sequence of outcomes in a purely chance task. *Journal of Personality and Social Psychology, 32*(6), 951–955.
Makridakis, S., & Moleskis, A. (2015). The costs and benefits of positive illusions. *Frontiers in Psychology, 6*, 859.
Matute, H., Blanco, F., Yarritu, I., Diaz-Lago, M., Vadillo, M. A., & Barberia, I. (2015). Illusions of causality: How they bias our everyday thinking and how they could be reduced. *Frontiers in Psychology, 6*.
McKay, R. T., & Dennett, D. C. (2009). The evolution of misbelief. *Behavioral and Brain Sciences, 32*(6), 493–510.
McKenna, F. P. (1993). It wont happen to me – Unrealistic optimism or illusion of control. *British Journal of Psychology, 84*, 39–50.
Moutsiana, C., Garrett, N., Clarke, R. C., Lotto, R. B., Blakemore, S. J., & Sharot, T. (2013). Human development of the ability to learn from bad news. *Proceedings of the National Academy of Sciences of the United States of America, 110*(41), 16396–16401.
Murray, S. L., Holmes, J. G., & Griffin, D. W. (1996). The benefits of positive illusions: Idealization and the construction of satisfaction in close relationships. *Journal of Personality and Social Psychology, 70*(1), 79–98.
Neff, L. A., & Geers, A. L. (2013). Optimistic expectations in early marriage: A resource or vulnerability for adaptive relationship functioning? *Journal of Personality and Social Psychology, 105*(1), 38–60.
Paley, J. (2014). Hope, positive illusions and palliative rehabilitation. *Progress in Palliative Care, 22*(6), 358–362.
Peterson, C. (2000). The future of optimism. *American Psychologist, 55*(1), 44–55.
Pronin, E., & Kugler, M. B. (2010). People believe they have more free will than others. *Proceedings of the National Academy of Sciences of the United States of America, 107*(52), 22469–22474.
Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem) – A reevaluation of the life orientation test. *Journal of Personality and Social Psychology, 67*(6), 1063–1078.
Schroeder, T. (2015). Desire. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy*. URL = <http://plato.stanford.edu/archives/sum2015/entries/desire/>. Accessed October 5th 2016.
Schultz, W., Dayan, P., & Montague, P. R. (1997). A neural substrate of prediction and reward. *Science, 275*(5306), 1593–1599.
Sedikides, C., Campbell, W. K., Reeder, G. D., & Elliot, A. J. (2002). The self in relationships: Whether, how, and when close others put the self "in its place". In W. Stroebe & M. Hewstone (Eds.), *European review of social psychology* (pp. 237–265). John Wiley & Sons Ltd..
Sedikides, C., Horton, R. S., & Gregg, A. P. (2007). The why's the limit: Curtailing self-enhancement with explanatory introspection. *Journal of Personality, 75*(4), 783–824.
Shah, P., Harris, A. J. L., Bird, G., Catmur, C., & Hahn, U. (2016). A pessimistic view of optimistic belief updating. *Cognitive Psychology*.
Sharot, T., & Garrett, N. (2016). Forming beliefs: Why valence matters. *Trends in Cognitive Sciences, 20*(1), 25–33.
Sharot, T., Korn, C. W., & Dolan, R. J. (2011). How unrealistic optimism is maintained in the face of reality. *Nature Neuroscience, 14*(11), 1475–1479.
Shepperd, J. A., Carroll, P., Grace, J., & Terry, M. (2002). Exploring the causes of comparative optimism. *Psychologica Belgica, 42*, 65–98.
Shepperd, J. A., Helweg-Larsen, M., & Ortega, L. (2003). Are comparative risk judgements consistent across time and events? *Personality and Social Psychology Bulletin, 29*(9), 1169–1180.
Shepperd, J. A., Klein, W. M. P., Waters, E. A., & Weinstein, N. D. (2013). Taking stock of unrealistic optimism. *Perspectives on Psychological Science, 8*, 395–411.
Shepperd, J. A., Malone, W., & Sweeny, K. (2008). Exploring causes of the self-serving bias. *Social and Personality Psychology Compass, 2*(2), 895–908.
Shepperd, J.A., Pogge, G., & Howell, J.L. (this issue). Assessing the consequences of unrealistic optimism: Challenges and recommendations. *Consciousness and Cognition*. http://dx.doi.org/10.1016/j.concog.2016.07.004.
Sweeny, K., Carroll, P. J., & Shepperd, J. A. (2006). Is optimism always best? Future outlooks and preparedness. *Current Directions in Psychological Science, 15*(6), 302–306.
Taylor, S. E. (1989). *Positive illusions: Creative self-deception and the healthy mind*. New York: Basic Books.
Taylor, S. E., & Brown, J. D. (1988). Illusion and well-being – A social psychological perspective on mental-health. *Psychological Bulletin, 103*(2), 193–210.
Taylor, S. E., & Brown, J. D. (1994). Positive illusions and well-being revisited – Separating fact from fiction. *Psychological Bulletin, 116*(1), 21–27.
Vyse, S. A. (1997). *Believing in magic: The psychology of superstition*. New York: Oxford University Press.
Weinstein, N. D. (1980). Unrealistic optimism about future life events. *Journal of Personality and Social Psychology, 39*(5), 806–820.
Young, M. C. (2014). Do positive illusions contribute to human well-being? *Philosophical Psychology, 27*(4), 536–552.

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