

Understanding the coherence of the severity effect and optimism phenomena: Lessons from attention.

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Abstract

Claims that optimism is a near-universal characteristic of human judgment seem to be at odds with recent results from the judgment and decision making literature suggesting that the likelihood of negative outcomes are overestimated relative to neutral outcomes. In an attempt to reconcile these seemingly contrasting phenomena, inspiration is drawn from the attention literature in which there is evidence that both positive and negative stimuli can have attentional privilege relative to neutral stimuli. This result provides a framework within which I consider three example phenomena that purport to demonstrate that people's likelihood estimates are optimistic: Wishful thinking; Unrealistic comparative optimism and Asymmetric belief updating. The framework clarifies the relationships between these phenomena and stimulates future research questions. Generally, whilst results from the first two phenomena appear reconcilable in this conceptualisation, further research is required in reconciling the third.

Keywords: Motivated attention; Automatic vigilance; Severity effect; Unrealistic optimism; Wishful thinking; Belief updating

Understanding the coherence of the severity effect and optimism phenomena: Lessons from attention.

A consensus in the psychological literature, both academic and popular, is that humans are prone to an almost universal optimism bias (see e.g., Sharot, 2012). The current paper focusses on optimism in likelihood estimates. One might define such optimism as an inappropriately high belief that a positively valenced event will occur, or an inappropriately low belief that a negatively valenced event will occur. Qualitatively, such optimism would be demonstrated by research findings that suggest likelihood estimates for positive events are greater than those for neutral events, or findings which suggest that likelihood estimates for neutral events are greater than those for negative events (holding all else constant). As recognised in Slovic (1966), the effect of event desirability in such an instance may be continuous (such that very positive events are perceived as more likely than moderately positive events for example), or categorical (very positive events are perceived as equally likely to occur as moderately positive events, but both are subjectively more likely than neutral or negative events).

To the extent that the ubiquity of optimism is accepted, a surprising result from the judgment and decision making literature is that participants seem to overestimate likelihoods of negative events, relative to neutral events (Harris, Corner, & Hahn, 2009; Risen & Gilovich, 2007; Vosgerau, 2010). Such a ‘severity effect’ appears to disprove any claim for the *universality* of optimism, but its existence also raises questions for the reconciliation of the probability judgment literature. How can this result co-exist with a literature that purports to demonstrate such ubiquitous optimism in people’s likelihood judgments?

The present paper draws on theorising from the attention literature to develop a cogent theoretical framework. I subsequently consider different sources of evidence for optimism and discuss how they can be situated within such a framework. It becomes apparent that some effects fit more readily into this framework than others, whilst others can be reconciled without the need for such a ‘fit’. For those that remain, these should consequently be considered separate phenomena. Alternatively, future research might of course disprove the existence of one or more of these effects. On this point, some might suggest that the much greater quantity of literature on optimism as opposed to the Severity effect suggests that the simplest reconciliation is to argue against the latter effect’s existence. Of course, future empirical research might demonstrate this to be the correct answer. At present, however, there is direct empirical support for this effect, which has yet to receive direct critique. In addition, as will be seen below, evidence from lower levels of cognition (namely attention) is more consistent with the Severity effect, than with any other effect of event utility¹ on likelihood estimates. Finally, a consideration of how these effects can be considered together in this way is informative and useful in understanding how they relate to each other. As the Severity effect appears, at least on first inspection, to be the odd-one-out here, it is the phenomenon that is of most use in constraining the organising framework.

The paper will take three phenomena reported in the optimism literature as examples of how the present framework can be applied. The three phenomena to be used as exemplars are: 1) likelihood estimates for positive events are higher than for neutral events (e.g., Bar-Hillel, Budescu, & Amar, 2008; Massey, Simmons, & Armor, 2011; Simmons & Massey, 2012); 2) people believe negative [positive] future life events to be less [more] likely to occur to themselves than to others (e.g., Weinstein, 1980, 1982); 3) people update their

¹ I attempt to keep my current terminology consistent with the terms used in described papers. In my own use of terms, there is a degree of interchangeability, but ‘valence’ typically corresponds to a categorical distinction between negative, neutral and positive events, whilst ‘utility’ is a continuous term.

likelihood estimates for future life events more in response to positive information than to negative information (e.g., Sharot, Korn, & Dolan, 2011).

Whilst a variety of phenomena have been brought under the banner of ‘optimism’ (see e.g., Kahneman, 2011), these three phenomena have been chosen carefully. Firstly, they all concern likelihood estimates about future events. Furthermore, (1) is the direct analogue for the Severity effect in the positive domain; (2) is the most used paradigm from which the optimism conclusion is derived; (3) purports to provide a direct motivation-based explanation for (2) – for which non-motivational explanations have recently dominated. Furthermore, as a relatively new and somewhat different methodology in the field, it is useful to show how (3) needs to be conceptualised such that its results can be compared with those from extant methods in the literature.

It is important to note that all three sets of findings have been questioned in the recent literature (on 1: Harris et al., 2009; Krizan & Windschitl, 2007; on 2: Hahn & Harris, 2014; Harris & Hahn, 2011; on 3: Harris, Shah, Catmur, Bird, & Hahn, 2013; Shah, Harris, Bird, Catmur, & Hahn, in press; Yu & Chen, 2015). The reader will notice that the author of the current paper is well represented in these critiques. It is important to note at the outset that I remain sceptical about the status of these phenomena, and am not stepping back from those critiques. This article is not, however, intended to revisit those arguments, or even to respond to their critics (Shepperd, Klein, Waters, & Weinstein, 2013; but see Hahn & Harris, 2014, for some response). Rather, in the present article, I will consider the potential for a reconciliation of the seeming inconsistency between the Severity effect and these purported optimism phenomena, which are still well regarded in the literature (e.g., Shepperd, Waters, Weinstein, & Klein, 2015; Windschitl & Stuart, 2015). In so doing, I will provide a novel clarification of the conceptual relationship between the three demonstrations of optimism outlined above. Furthermore, in light of extant critiques of the methodologies employed,

identifying general consistencies and inconsistencies among these phenomena provides insight both into the likely true status of the phenomena, and also into the coherence and thus plausibility of alternative explanations.

The Severity effect

In the literature on the interpretation of verbal probability expressions (VPEs; e.g., ‘likely’), interpretations have been shown to be susceptible to a range of context effects (e.g., Beyth-Marom, 1982). One of the largest influences on interpretations is the base rate of the event being described (Fischer & Jungermann, 1996; Wallsten, Budescu, & Cox, 1986; Weber & Hilton, 1990) – that is, ‘unlikely rain in the UK’ would be seen as more likely than ‘unlikely rain in the Sahara desert.’ Once controlling for this effect, however, a further influence on the interpretations of VPEs is the severity of the event being described. Specifically, numerical translations of VPEs are systematically higher when the VPEs refer to negative events than to (relatively) neutral events. Bonnefon and Villejoubert (2006) termed this effect the ‘severity bias,’ and it has been observed in a variety of domains including health (Bonnefon & Villejoubert, 2006; Juanchich, Sirota & Butler, 2012), financial investment outcomes (Juanchich et al., 2012), environmental concerns (Harris & Corner, 2011) and offender profiling (Villejoubert et al., 2009). These studies have employed hypothetical vignettes in both the first (Bonnefon & Villejoubert, 2006; Harris & Corner, 2011, Studies 1 & 2; Juanchich et al., 2012) and third (Harris & Corner, 2011, Study 3; Villejoubert et al., 2009) persons. Harris and Corner (2011), among others (e.g., Juanchich et al., 2012), subsequently used the term ‘severity effect’ to label this phenomenon. In the current paper, I take the effect of negative utility on interpretations of VPEs as a specific instantiation of the Severity effect, but more generally I use the term to describe the

phenomenon whereby likelihood estimates for negative outcomes are greater than for neutral outcomes (Harris et al., 2009; Risen & Gilovich, 2007; Vosgerau, 2010).

Risen and Gilovich (2007), for example, added to previous explanations (e.g., those based upon the illusion of control – Langer, 1975 – or regret – e.g., Gilovich & Medvec, 1995; Gleicher, Kost, Baker, Strathman, Richman, & Sherman, 1990; van de Ven & Zeelenberg, 2011) for people’s reluctance to exchange lottery tickets. They proposed that a previously owned (i.e., exchanged) ticket winning the lottery constituted a more negative outcome than did a ticket that had not previously been owned. Participants rated a ticket they previously owned as more likely to win the lottery than one they still owned. Moreover, the previously owned ticket was seen as more likely to win, the more undesirable that event was (e.g., if the ticket was subsequently owned by the participant’s enemy as opposed to their friend). Risen and Gilovich’s explanation for this result was that negative outcomes are more readily imagined than neutral outcomes, as evidenced by participants being quicker to identify that a story ending made sense, “Allison wins the lottery with the ticket you exchanged,” when Allison was an enemy rather than a friend.² The link between imagination and prediction (see e.g., Carroll, 1978) subsequently leads to inflated likelihood estimates for negative outcomes (Risen & Gilovich observed that faster identification of a meaningful ending was associated with a higher likelihood judgment for that ending).

² Bilgin (2012) proposed a similar mechanism for his finding that participants were more confident that a (hypothetical) negative outcome would occur than a (hypothetical) positive outcome, when the likelihood of these outcomes were described with numerical probabilities. This result demonstrates a more extreme severity effect, whereby a negative outcome is perceived as more likely than a positive outcome, which would be predicted were the impact of negative valence stronger than positive valence (à la automatic vigilance – see also Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001; Rozin & Royzman, 2001).

Potential paradigmatic differences between severity effect studies and optimism studies.

Specific studies might generate results indicative of optimism or a severity effect for a variety of reasons in addition to the utility of the event being considered.

One class of reasons might be considered ‘functional.’ That is, there are some situations in which it might be beneficial to hold an overly positive (optimistic) belief, and others in which it is beneficial to hold an overly negative (pessimistic) belief. Weber (1994), for example, proposed that individuals might be sensitive to asymmetric loss functions. That is, where the cost of overestimating a likelihood is less than the cost of underestimating it, individuals will bias their estimates in the direction of the least costly error. Indeed, Harris et al. (2009) proposed this as the explanation for the severity effect they observed.

In a similar vein, Shepperd and colleagues (e.g., Carroll, Sweeny, & Shepperd, 2006; Shepperd, Carroll, & Sweeny, 2008; Sweeney, Carroll, & Shepperd, 2006) propose a concept of ‘preparedness’ such that individuals adopt an optimistic or pessimistic perspective according to which will be most beneficial (note, however, that these ‘more optimistic’ and ‘more positive’ expectations are not necessarily assumed to be optimistic or pessimistic in an absolute sense – just in relation to each other – Carroll et al., 2006; Sweeney et al., 2006). As an example of ‘preparedness’ in action – though not with likelihood estimates - Shepperd, Ouellette and Fernandez (1996, Study 2) compared university students’ predictions of their exam scores (at four timepoints) with their actual obtained exam scores. Participants overestimated their exam scores (were optimistic) a month before the exam, were realistic in their estimates immediately following the exam and three days later (50 minutes before receiving their results), and were pessimistic immediately before receiving the feedback. A preparedness account asserts that optimism might be beneficial to encourage effective goal

pursuit (studying for the exam). Immediately before receiving feedback, however, an underestimate of performance is less costly an error as it protects the individual against emotional effects associated with disappointment ('bracing for loss'). None of the literature cited above on the Severity effect investigates different timepoints, and the majority of studies employ fictional outcomes such that feedback will not be obtained. Only in Vosgerau (2010) was the likelihood estimate associated with a real outcome. Participants provided higher estimates of the likelihood that a 6 would turn up twice in four die rolls when such a result ensured they lost a Carnegie Mellon shot glass than when it was associated with no outcome. Whilst participants might have braced against the possible loss associated with losing the shot glass, there was also a \$1 accuracy incentive that may have counteracted that.

Moving away from 'functional' accounts for optimism and severity effects, it is recognised that some ambiguity in the available information is required for biases to emerge (e.g., Kunda, 1990; Sharot & Garrett, 2016; Windschitl & Stuart, 2015). Participants in Optimism 2 and Optimism 3 studies are estimating their own likelihood of experiencing future life events, a likelihood that is unknown to the experimenter and for which the available information is likely ambiguous. Whilst ambiguity is preserved in studies investigating interpretations of inherently vague VPEs, Harris et al. (2009), Risen and Gilovich (2007) and Vosgerau (2010) all communicated information to participants such that a correct answer was possible to provide from the information given. For example, Harris et al. (2009, Experiment 1) asked participants to estimate the chance that a girl would pick a fatally poisonous apple (high severity – 'sour' in low severity condition) in an orchard if she were to randomly pick an apple. The proportion of bad to good apples was displayed to participants in a large visual matrix.

It is true that a myriad of consequential differences could exist between studies, some of which could tap into theoretically motivated moderators (but see Hahn & Harris, 2014, for

discussion of caution that should be undertaken when considering moderators). The significance of these moderators will, however, be clearer the better one understands how these effects fit together in terms of the basic phenomena to which they purport to relate: a biasing effect of utility on likelihood estimates. Locating these phenomena within a single organising framework is therefore a fruitful research endeavour that is able to generate some answers and stimulate further specific research questions and discussions.

Aim of the current paper

The aim of the current paper is not, therefore, to develop a framework within which all phenomena related to the interdependence of utility and probability *must* be reconcilable. Rather, a deliberately simple framework is proposed which serves four main purposes: 1) It demonstrates how four different phenomena (as example cases) need to be conceived in order to be contrasted within one framework; 2) It identifies those phenomena which are consistent with one another and therefore might plausibly be driven by the same underlying mechanism; 3) It highlights those phenomena which are inconsistent with one another, and thus require an alternative mechanistic explanation; 4) It stimulates further research questions.

Lessons from attention

The greater tendency to imagine, or dwell upon, potential negative events is consistent with the automatic vigilance hypothesis that has been investigated in lower level cognitive processes, such as attention (e.g., Pratto & John, 1991). The automatic vigilance hypothesis essentially maintains that negative information receives greater attentional weight than does neutral or positive information – potentially due to the need to respond quickly to immediate threats (see e.g., Pratto & John, 1991). Pratto and John (1991; but see Larsen, Mercer, &

Balota, 2006), for example, demonstrated that participants' ability to name the colour ink a word was written in was slower when the semantic meaning of the word was a negative personality trait. Such a result is suggestive of an 'attention-grabbing power of negative social information' as their title suggests. Moreover, a subsequent surprise free recall test led to greater recall of negative words than of positive words. Such a result is opposite to that which would be expected were the slower reaction times in the colour naming task for negative words resulting from a defensive process which minimised the impact of the threatening information. Consequently, these results were taken to support a heightened perceptual vigilance to negative information. Fox, Russo, Bowles and Dutton (2001) subsequently provided evidence that this interference effect of negative information did not result from negative information attracting attention more quickly than neutral or positive information. Rather, they used a spatial cueing paradigm to demonstrate that effects such as Pratto and John's stem from a delayed *disengagement* to negative stimuli. Specifically, the major finding in Fox et al. (2001) was that responses to a neutral target were equally fast when the location of that target was cued by a positive, neutral or negative prime. When, however, the prime was *invalid* (it appeared in the opposite location to the target), responses were slowed to a greater extent when that prime was negative than when it was neutral or positive.

The proposed difficulty in disengaging attention from negative or threatening stimuli is also recruited as an explanation for an oft-observed effect in word recognition, whereby recognition of negative emotional words is slower than that for positive or neutral words (e.g., Estes & Adelman, 2008a, 2008b; Kuperman, 2015; Kuperman, Estes, Brysbaert, & Warriner, 2014). On this account, the slowed disengagement of attention to negative stimuli (automatic vigilance) slows the engagement of recognition responses, for which the valence

of the stimuli is irrelevant (Estes & Verges, 2008), a result which has been shown to be (mostly) independent of the arousal of the stimuli (Kuperman et al., 2014).

Were the seeming inconsistency between the Severity effect and optimism irreconcilable, the seeming dominance of negative information in such a low level process as attention would seem to tilt the balance in the direction of the Severity effect at the expense of optimism. A wider perspective on the attentional literature, however, suggests that such a binary perspective (optimism OR Severity effect) might not be necessary.

The aforementioned effect of emotion valence on word recognition is controversial, and an evaluation of the debate is outside the scope of the current paper. The predominant contrasting position to the automatic vigilance hypothesis, however, is the motivated attention hypothesis (Kousta, Vinson, & Vigliocco, 2009; Vinson, Ponari, & Vigliocco, 2014; Yap & Seow, 2014). Proponents of this position report a contradictory pattern of results in the word recognition literature, namely that there is a speed advantage for both negative and positive emotional words over neutral words³. The motivated attention hypothesis asserts that the relevance of both positive and negative stimuli for the attainment of goals and survival leads to more rapid processing for such stimuli.

The potential for valence *per se*, rather than negative or positive valence specifically, to have some primacy in attention is also supported by more recent findings. For example, in visual-search tasks, stimuli previously paired with losses or negative events (e.g., pain), as well as stimuli previously paired with rewards, serve to disrupt performance when included as distractors in a subsequent visual search task (Wang, Yu, & Zhou, 2013; see also, Wentura, Müller, & Rothermund, 2014). In Le Pelley, Pearson, Griffiths and Beesley (2015), the effect of rewards (no loss condition was included) was observed even though the

³ Different results are presumed to arise from different lexical controls, a discussion which is outside the scope of the present paper.

distractor had never served as a response stimuli and was thus *always* task-irrelevant. This distractor simply indicated whether correct performance on a particular trial would result in a high or low reward. When indicating high reward, participants' attention was drawn towards it (demonstrated in eye movement data), thus, ironically, impairing task performance on these high reward trials. Evidence for attentional capture in non-spatial tasks also suggests a general motivation of attention via relevance – i.e., both negatively and positively valued stimuli capturing attention more than neutral stimuli (see e.g., Brosch, Sander, Pourtois, & Scherer, 2008).

Whilst recognising that the debate is ongoing in the attentional literature (and especially the word recognition literature), the motivated attention hypothesis demonstrates that the seeming inconsistency between the optimism phenomena outlined above and the Severity effect might not require as much reconciliation as might be assumed on first appraisal. The divergent results proffered in support of the automatic vigilance account and the motivated attention account, their implications for the attentional priority of differently valenced events, as well as effects of utility on likelihood estimates that could be considered consistent with each of them are displayed in Figure 1. In the forthcoming sections, I consider the consistency of each of the three optimism phenomena outlined above with the frameworks outlined in Figure 1. Whilst it seems impossible to reconcile any of the optimism phenomena with the left-hand panel of Figure 1, attempting to reconcile the phenomena with the right-hand panel (motivated attention) proves to be an informative exercise.

It is worth highlighting that I am not proposing that the optimism phenomena discussed need to be consistent with motivated attention as being a cause (I am silent on this point rather than for or against it). Rather than explicitly suggesting it as a mechanism, motivated attention serves as an organising framework for opposing effects of valence in

attention and word recognition. How, then, do the similarly opposing seeming severity and optimism effects fit within an analogous framework (bottom right panel of Figure 1)?

Optimism 1: Likelihood estimates for positive events are higher than for neutral events ('Wishful thinking')

Optimism 1 is often brought under the terminology of 'Wishful thinking' or the 'Desirability bias.' Krizan and Windschitl (2007) argue that these terms require the inference of a clear causal effect of desirability on likelihood judgments. Consequently, they highlight the importance of *manipulations* of desirability. They argue, for example, that the demonstration of optimism oft-observed in people's estimates of the likelihood of preferred teams winning upcoming sports matches (e.g., Babad, 1987; Babad & Katz, 1991; Massey et al., 2011; Simmons and Massey, 2012) or preferred politicians' electoral outcomes (e.g., Babad, 1997; Granberg & Brent, 1983; Hayes, 1936) do not demonstrate a causal influence of desire on likelihood estimates. Rather, the lack of a manipulation of desire leaves open alternative possibilities such as, for example, an asymmetry in one's information about different contenders based on specific individual circumstance. Although I agree with Krizan and Windschitl's position that determining the precise locus of these effects is important, this is not the focus of the current discussion. Nevertheless, Bar-Hillel, Budescu, and Amar (2008) undertook a study in the sporting domain (soccer World Cup predictions) in which they did manipulate the desirability of the outcome. Specifically, the desirability of a team winning was manipulated by associating that result with a monetary reward for otherwise non-partisan participants. Endowed teams were subsequently judged as more likely to win than non-endowed teams (see also, Stuart, Windschitl, Smith, & Scherer, in press), although the effect was more parsimoniously explained as a mere salience effect, rather than a direct

wishful thinking effect. In a more controlled setting, Vosgerau (2010) found that participants estimated the likelihood of exactly two 6s being rolled in 4 dice rolls as higher when that result would win them a shot glass than when this outcome had no consequence for them⁴ (although this result was not replicated in de Molière & Harris, 2016).

Wishful thinking effects are entirely consistent with the motivated attention hypothesis, such that valenced events are assigned higher subjective probabilities than are non-valenced events (see Figure 1, bottom right panel). The critical comparison in both the attention literature and this likelihood estimation literature is between valenced events and neutral events, with valenced events (whether positive or negative) being prioritised (either in attention or higher likelihood estimates) over non-valenced events. Vosgerau (2010) argued that Wishful thinking and the Severity effect might both obtain as a result of the arousal experienced through having a stake (positive or negative) in the outcome. Although the mechanisms underlying the effects discussed in this paper are not our current focus, it is interesting to note that de Molière and Harris' (2016) subsequent failure to obtain support for Vosgerau's hypothesis is in line with expectations from the word recognition literature, where arousal accounts for a negligible proportion of the variance in reaction times in comparison with valence (Kousta et al., 2009; Kuperman et al., 2014). Thus, although I am not necessarily proposing it as the underlying mechanism, the Severity effect and Wishful thinking could plausibly both obtain from a mechanism whereby selective attention to valenced events increases their subjective likelihood, in line with the mechanism proposed in Risen and Gilovich (2007).

⁴ Participants' judgments of *not* rolling exactly two 6s were also inflated in this condition, but this discussion falls outside the scope of the present paper.

Optimism 2: People believe negative [positive] events to be less [more] likely to occur to themselves than to others ('Unrealistic comparative optimism')

In the terminology of Shepperd et al. (2013), Optimism 2 is 'unrealistic comparative optimism' (UCO), which is most commonly investigated at the group level. The ubiquity of group level UCO studies stems from the major difficulty associated with studying optimism in people's risk estimates about genuinely consequential, real-world life events. Namely, that the experimenter does not have privileged information about a participant's objective likelihood of experiencing a particular event. As an example, if I ask a participant what their likelihood of contracting lung cancer is, whatever estimate they provide, I have no objective reference against which to compare their estimate. Even if I know the average risk statistic for the population as a whole, that statistic will not necessarily represent a given individual's chance, as their risk factors might place them at a lower or higher risk (see also, e.g., Weinstein & Klein, 1995). Recognising this, Weinstein (1980) introduced the comparative optimism method, which measures group level UCO.

In the 'direct' instantiation of the comparative optimism method, participants compare their own likelihood for experiencing a particular event with the average person's likelihood. The scale extends from 'much lower than the average person' to 'much higher than the average person,' with the average person's chance being the midpoint. On the 'indirect' instantiation, participants provide separate ratings for their own risk and the average person's risk. The logic underlying the comparative method is that, whilst some people will have a lower likelihood than the average person and others will have a higher likelihood, the average of their responses should (by definition) be the average. On the 'direct' method this corresponds to the average response equalling the midpoint of the scale. On the 'indirect'

method this corresponds to no overall difference between estimates about own risk and estimates of the average person's risk. Any reliable deviation of the group's average response from this standard is taken as evidence of a systematic group level bias. For negative events, an average lower than the midpoint is taken as evidence of optimism, whilst for positive events, an average higher than the midpoint is taken as evidence of optimism (see Harris & Hahn, 2011, for a critique of the instantiation of this methodology in practice). These inferences stem from the fact that (essentially by definition) people don't want to experience negative events (e.g., cancer) but do want to experience positive events (e.g., owning their own home).

UCO can be related to Wishful thinking and Figure 1 with the simple assumption that a valenced event occurring to the self is a more extreme outcome (and thus further from the midpoint of the x-axis in Figure 1) than that event occurring to 'the average person' (note that the term 'unrealistic *optimism*' implies this assumption). Consequently, the finding that participants see positive events as more likely to occur to the self than the average person (Weinstein, 1980) is consistent with the results of Optimism 1, suggesting that a more positive event (good thing happening to me) is rated as more likely than a less positive event (good thing happening to someone else). Such a result would consequently also be consistent with a framework analogous to motivated attention (Figure 1, bottom right panel). The consistently observed result for negative events, however, is that they are seen as less likely to occur to the self than to the average person (for reviews see Helweg-Larsen & Shepperd, 2001; Shepperd, Carroll, Grace, & Terry, 2002; Shepperd et al., 2013). Translating this into an effect of negative utility on likelihood estimates, a more negative event (bad thing happening to me) is rated as *less* likely than a less negative event (bad thing happening to someone else). Such a result is clearly inconsistent with the Severity effect and, indeed, *either* of the frameworks derived from the attentional literature (Figure 1).

The inconsistency of the results from the comparative optimism method with the postulated relationships in Figure 1 are even greater when one realises that the comparative optimism observed for positive events in Weinstein (1980) is, in fact, frequently not observed. Rather, a typical pattern of results is that average comparative estimates are below the midpoint for *both* negative and positive events (Chambers, Windschitl, & Suls, 2003; Kruger & Burrus, 2004; Moore & Small, 2008). Such a pattern suggests simultaneous UCO for negative events and ‘unrealistic comparative pessimism’ (UCP) for positive events. Moreover, such a pattern is precisely the opposite of what would be predicted from the motivated attention hypothesis. These results from the comparative optimism paradigm thus do not immediately seem easily reconcilable with the Severity effect.

The most recent reviews on optimism that include a discussion of UCO (Shepperd et al., 2013, 2015; Windschitl & Stuart, 2015) are ambivalent as to the underlying mechanism for UCO data. Shepperd et al. (2013, p. 396), for example, state:

“We define unrealistic optimism as a favorable difference between the risk estimate a person makes for him- or herself and the risk estimate suggested by a relevant objective standard... Unrealistic optimism also includes comparing oneself to others in an unduly favorable manner... Our definition also makes no assumption about why the difference exists. The difference may originate from motivational sources, such as a desire to deny vulnerability to harm, or from cognitive processes, such as the person-positivity bias, egocentric thinking, or overuse of the representativeness heuristic.”

Shepperd et al. (2013, 2015; see also Windschitl & Stuart, 2015) thus acknowledge a potential role for both motivational and cognitive mechanisms. Explanations must, however, account for the simultaneous observation of both UCO (for negative events) and UCP (for

positive events). For me, the most parsimonious accounts for these results from the comparative methodology are therefore cognitive mechanisms, which give no causal role to valence in explaining these results (e.g., egocentrism, Chambers et al., 2003; focalism, Kruger & Burrus, 2004; differential regression, Moore & Small, 2008; statistical artifact, Harris & Hahn, 2011; for an early review including further non-motivated accounts see Chambers & Windschitl, 2004)⁵. Rather, all these accounts posit that the observed patterns of results arise from the base rates of the events. Specifically, comparative estimates of rare events (both negative and positive) are rated as *less* likely to occur to the self than the average person, whilst comparative estimates of common events are seen as *more* likely to occur to the self than the average person (Chambers et al., 2003; Kruger & Burrus, 2004; Moore & Small, 2008). With the exception of Harris and Hahn's (2011) account, the others do not question the status of UCO in terms of recent definitions which are unconcerned with its underlying mechanisms (Shepperd et al., 2013, 2015; Windschitl & Stuart, 2015). Because, however, these accounts prescribe no causal role of valence, it is not necessary to reconcile UCO within Figure 1. Consequently, the inconsistency with the Severity effect (and Figure 1) is apparent rather than real.

The studies demonstrating UCO and UCP cited above have utilised the direct comparative optimism method. One of the major cognitive mechanisms outlined above, egocentrism (e.g., Chambers et al., 2003; see also, Weinstein, 1980; Weinstein & Lachendro, 1982), posits that people answer these comparative questions by focussing on whether their own chances of experiencing each event are high or low, with an insufficient recognition that other people's chances will also be low for rare events and high for common events (Chambers et al., 2003). Because the indirect method explicitly asks about the average

⁵ Note that I return to consider motivational explanations below in the section, "What about motivated accounts of UCO and optimistic belief updating?"

person's risk (as well as the individual's risk), this measure should not be biased by egocentric processes (see also, e.g., Chambers & Windschitl, 2004; Ranby, Aiken, Gerend, & Erchull, 2010). This has led some researchers to recommend indirect methods over direct methods (e.g., Covey & Davies, 2004).

Using the indirect method, the relationship between event frequency and comparative optimism is often attenuated, absent or even reversed (Chambers et al., 2003; Covey & Davies, 2004; Price et al., 2002; Rose et al., 2011; see also Rose et al., in press). Consequently, where seemingly pessimistic responses are observed (e.g., for rare positive events or common negative events) with the direct method, data are typically more consistently in an optimistic direction across events using the indirect method (Chambers et al., 2003; Kruger & Burrus, 2004; Rose, 2010; Rose et al., 2011). Klar and Ayal (2004; see also Ranby et al., 2010) proposed a mathematical explanation for the different relationships observed with event frequency using the indirect method as opposed to the direct method, indicating that ceiling and floor effects would constrain the potential to observe optimism [pessimism] for very rare [common] events (if a participant uses the lowest point on a frequency scale to indicate that an event is very unlikely to occur to the average person, they are unable to represent a belief that they believe it is still less likely to occur to them).

Rose et al. (2011) reported that the optimism pattern (as measured by the indirect method) was enhanced the more negative the negative event, a result in line with a defensive, motivational bias. The evidence for such a pattern overall is, however, mixed and inconclusive (Helweg-Larsen & Shepperd, 2001). P. R. Harris, Griffin and Murray (2008), for example, observed the opposite relationship with event severity (such that UCO – measured through the indirect method – was reduced for more severe negative events) and explicitly suggested that such a result was consistent with a vigilance account. – “consistent

with findings that more negatively valenced events automatically receive additional attentional resources” (p. 1235).

Thus, results obtained using the indirect method (and their interpretation) are not as clear as might be hoped (see Klar & Ayal, 2004, for further critiques). Finally, although egocentrism is seemingly reduced in studies using the indirect method, alternative non-motivational explanations do not rely on egocentric processes and additionally apply to the indirect scale (e.g., Harris & Hahn, 2011; Moore & Small, 2008). Although the relative merits of these accounts remain to be directly compared with motivational accounts for the indirect method, it remains possible that a non-motivational account will prove to be the most parsimonious explanation for these data, as with the direct method.

Finally, UCO can also be measured at the individual level. This is possible in situations where it can be assumed that the experimenter is in possession of knowledge that allows them to reliably classify a participant as being above, below or equal to average risk for experiencing a particular event. Whilst the accuracy of such statistics could always be debated, there do exist validated risk instruments, especially within the health domain, that enable such classifications (e.g., Robbins’ Health Risk Appraisal – see Radcliffe & Klein, 2002). Presumably due to the need for such risk instruments, the volume of research looking at UCO at the individual level is far smaller than that for the group level, typically consisting of studies looking at risk for individual negative events such as drinking problems (Dillard, Midboe, & Klein, 2009), heart attacks (Radcliffe & Klein, 2002) and breast cancer (Waters, Klein, Moser, Yu, Waldron, McNeel, & Freedman, 2011). These studies reveal more unrealistic optimists than unrealistic pessimists, which might be suggestive of a tendency for underestimating one’s relative risk of negative events. However, each study only looks at estimates about a single event, and unrealistic optimism was far from a universal finding (56% of individuals were unrealistically optimistic in Radcliffe & Klein, 2002; 42% in

Waters et al., 2011; and between 60% and 69% - depending on timescale – in Dillard et al., 2009). Consequently, the ubiquity of UCO is unclear from these results, especially as each individual might be optimistic for some events, realistic for others and pessimistic for still others. With ever more technological advancements, measuring UCO at the individual level is an important area for future research. Such research might provide better insights into underlying mechanisms, but I note here that – as alcohol problems, heart attacks and breast cancer all have a lifetime prevalence less than 50% - the results from these studies are also explainable in terms of a non-motivated explanation: either whereby the rareness of the event is underestimated more for the average person (differential regression – Moore & Small, 2008); or whereby participants' estimates of the base rate are regressive and these regressive estimates inform risk estimates about both the average person and the self (base rate regression – Harris & Hahn, 2011); or both (see Hahn & Harris, 2014; Harris & Hahn, 2011, for further discussion of how these accounts diverge).

In sum, although future research might provide conclusive evidence for motivational mechanisms underlying UCO, the potential for non-motivated processes to explain the data in terms of event frequency rather than valence, enables reconciliation with the Severity effect and the Wishful thinking effect without the need to locate UCO in terms of Figure 1.

Optimism 3: People update their likelihood estimates more in response to positive information than to negative information (‘optimistic belief updating’)

A recent addition to ‘optimism methodology’ is the update task, developed by Sharot et al. (2011). In the original (and typical) instantiation of this method, participants are presented with 80 negative life events and asked to type in a percentage estimate for how likely they think they are to experience each event. Following each estimate, they are

presented with a statistic that represents the likelihood of that event being experienced by someone in the same socio-cultural environment as themselves. Having done this for all 80 events, participants then have to make an estimate for each of the events again. The critical comparison is between the amount that participants update their estimates when the statistic they are presented with is lower than their initial estimate versus when it is higher than their initial estimate.⁶

The structure of this method is rather different from the methodologies discussed thus far. All the events are negative, thus this method does not address differences in estimates for events of different valence. Sharot et al. (2011) did, however, set out to answer the question of how optimism in risk estimates (e.g., UCO) could be maintained given that people constantly receive information and feedback, from which they should learn and calibrate their likelihood judgments. More specifically, the method purports to demonstrate the existence of optimistic belief updating – “here we identified an optimistic learning bias” (Sharot et al., 2011, p. 1478) – and behavioral results have been associated with the neural reward circuit (Kuzmanovic et al., 2016; Sharot, Guitart-Masip, Korn, Chowdhury, & Dolan, 2012; but see Shah et al., in press [especially Section 8.1], for critiques of the inferences that can be drawn from these results). How, therefore, is this to be represented in terms of Figure 1?

In order to relate the update methodology to the present discussion and framework, it is not the valence of the event that is relevant, but the valence of the information that the participant receives *about* that event. Specifically, the new information that participants

⁶ A difference in ‘learning score’ (correlation between initial difference between participants’ likelihood estimate and the objective statistic with the amount they update their belief) is also reported – and sometimes even the focus in update method papers (Moutsiana, Garrett, Clarke, Lotto, Blakemore, & Sharot, 2013). The typical finding with this measure is that a greater correlation is observed on desirable trials than undesirable trials. Such a finding is irrelevant with respect to optimism, however, because correlations are insensitive to absolute values. For example, an optimistic updater who consistently updates their belief by 1 percentage point for every initial difference of 2 percentage points on undesirable trials and by 2 percentage points on desirable trials will have the same learning score (a correlation of 1) for both desirable and undesirable trials.

receive (the likelihood of that event being experienced by someone in the same socio-cultural environment) is labelled as positive when it is lower than the estimate provided by participants and negative when it is higher. As with the comparative methodology (see Optimism 2), this follows from the recognition that lower risks (as opposed to higher risks) are more desirable for negative events (but see Harris et al., 2013; Shah et al., in press, for why the operationalisation of this in the update task is an oversimplification; see also Kuzmanovic, Jefferson, & Vogeley, 2015). Consequently, the valence of the event itself is only relevant because the valence of the all-important information is dependent on it (were the event positive, the information would be positive were it *higher* than the participant's estimate; were the event completely neutral – e.g., the likelihood that the next car to drive past will be red – it would be non-sensical to define a lower objective statistic as *either* positive or negative).

The typical result observed in the update method is that participants update their estimates more in response to positive information than negative information (thus serving to maintain optimistic beliefs). A comparison with neutral information is not possible, since an individual *shouldn't* update their risk estimate upon learning that the objective statistic is equal to their original estimate, which would presumably be the definition of neutral information when all 80 events considered are negative (the 'next car' example above would enable a comparison with the updating for neutral events).

Even without a neutral baseline, however, it is possible to consider the consistency of results from this method with the patterns predicted in the proposed organisational framework (Figure 1, bottom right panel). Simply, the framework predicts no difference in the effect of equivalently valenced (extreme) positive versus negative information. Because of the inability to locate the update effect within Figure 1, it is apparent that it is also inconsistent with the existence of the Severity effect.

Although the majority of studies employing the update method have used only negative events, Shah et al. (in press) modified the update method to include positive events in five studies. For the positive events, participants again updated their likelihood judgments more when the risk statistic provided to them was lower than their original estimate. For positive events, however, information that the likelihood is lower than previously thought is negative information. Thus, with positive events participants appear to update belief more in response to undesirable than desirable information. In isolation, this result could be considered consistent with the Severity effect and automatic vigilance (Figure 1, left panel), but it does not fit with the framework that can also account for optimism phenomena (motivated attention, Figure 1, right panel).

In conclusion, therefore, results from the update method with negative events are inconsistent with both the left and right columns of Figure 1, whilst results with positive events are consistent with the left column, but inconsistent with the right column (the framework proposed here and that which can accommodate some optimism phenomena). The initial seeming inconsistency of UCO with Figure 1 was eased with the recognition that a non-motivational cognitive mechanism could underlie UCO results. The data obtained using the update method share similar properties in that the same directional effects are observed for both negative and positive events, but the interpretation of these effects in terms of valence or optimism is switched. Shah et al. (in press) demonstrated, in simulations, that the pattern of results reported above for both negative and positive events were readily obtained from rational Bayesian agents updating their belief equally to desirable and undesirable information. They additionally highlighted problems with the methodology that could give rise to this artifactual optimism/pessimism. Whether there is more to optimistic belief updating than a mere statistical artifact remains to be seen, but the current conceptualisation does support a non-valence based explanation of some kind.

The update method, attention and neutral events.

The update method is the only method of those reviewed thus far in this paper that typically requires a speeded response. Perhaps more relevantly, the new likelihood statistic presented to participants is only displayed for 2 seconds, with an additional inter-stimulus interval of 1-3 seconds before the next event is presented (Sharot et al., 2011). Participants must therefore process this information relatively quickly. Consequently, of the methods discussed in this paper, this is the one that might be most expected to be directly influenced by a biased attentional mechanism.

The motivated attention (right hand) panel of Figure 1 illustrates the importance of neutral stimuli for fully understanding the influence of valence on processing. Whilst neutral stimuli are included in work demonstrating Wishful thinking (Optimism 1), they are not included in either UCO studies (Optimism 2) or belief updating tasks (Optimism 3). Non-motivated accounts, such as egocentrism, advanced to explain UCO would predict that mean responses would deviate from zero on that measure even for non-valenced events, thus underlining the irrelevance of valence on such an explanation. The inclusion of neutral events would likewise be informative for understanding the precise nature of the bias in people's use of information in the update task. For example, the motivated attention account would predict that participants would attend more to information pertaining to emotionally relevant events (both positive *and* negative). Consequently, one might observe different use of information in general (whether higher or lower than an initial estimate) for negative and positive events than for neutral events (e.g., the colour of the next car).

It is worthy of note that the exact nature of this difference is difficult to predict a priori. Increased attention to the valenced event might disrupt processing of the likelihood information thus inhibiting learning. Alternatively, enhanced attention to the stimuli might

lead to more effective learning. Slovic's (1966) observation of a greater deviation from optimal Bayesian learning (he did not report in which direction) for valued (both positive and negative outcomes) rather than non-valued outcomes is in line with the former prediction. These different predictions correspond roughly to the distinction between sign-tracking and goal-tracking effects of attention (Boakes, 1977). Le Pelley et al. (2014) observed that an otherwise task-irrelevant cue signalling a high reward trial captured attention to the detriment of task performance. Such a 'sign-tracking' effect would be analogous to demonstrating inferior learning about valenced events than non-valenced events, as presumably it would be advantageous to learn more efficiently about relevant, valenced events.

What about motivated accounts of UCO and optimistic belief updating?

The proposed reconciliation of Optimism 2 was based upon non-motivational explanations, whilst it was suggested that these might likely also constitute the most parsimonious explanations for Optimism 3. It should be noted, however, that, whilst I hold that non-motivated accounts provide the most parsimonious explanations, there are alternative reconciliations possible for both of these that do permit a motivational explanation.

Thus far I have conceptualised the three optimism phenomena as phenomena of probability judgment. Optimism 2, UCO, is, however, often conceptualised as being a specific instantiation of a general self-enhancement bias, similar to (for example) the better-than-average effect and exaggerated perceptions of self-control (Taylor & Brown, 1988; see also e.g., Beer, Chester, & Hughes, 2013; Brown & Gallagher, 1992; Heine & Lehman, 1995). On this conceptualisation, being less at risk than the average person for negative events is just another way in which the self is perceived as superior and protected against

threatening information (see also Sedikides & Green, 2000, 2004). Once UCO (and, by extension, optimistic belief updating – see Kuzmanovic et al., 2015, 2016) is conceptualised in this manner, it does not require reconciliation within the current framework (Figure 1, bottom right panel). Rather, a discussion could centre on the importance of the events for the individual's self-concept, for example. Brown (2012) proposed just such an argument in response to the research tide suggesting non-motivational cognitive accounts for the better-than-average effect, and especially results demonstrating a worse-than-average effect (similar to the results demonstrating UCP with rare positive events).

A thorough critique of the literature in support of motivational self-enhancement versus non-motivational accounts is beyond the scope of the current paper. The comparison of the four phenomena enabled through their location in the language of Figure 1, however, clarifies *why* a motivational account requires that UCO and optimistic belief updating should be considered distinct (as self-enhancement biases rather than general probability judgment biases) from the Severity effect and a general wishful thinking bias. Furthermore, I argue that this differentiation is not routinely recognised within the literature (c.f. Shepperd et al., 2013). Thus, researchers maintaining a motivational account for UCO and optimistic belief updating must exert care in their location of these phenomena within the literature, and effort must be taken to ensure that the theoretical account of such phenomena are not suggestive of a logical inconsistency. The framework outlined in Figure 1 serves to assist in identifying future (or past) inconsistencies.

This paper is not the first to recognise a seeming attentional primacy of negative information, nor to try and reconcile it with a literature suggesting that people prefer to minimise the influence of negatively valenced information on their beliefs. Taylor (1991; see Baumeister et al., 2001, for related arguments) proposed the mobilization-minimization hypothesis. This hypothesis proposes that negative events, moods and information are

selectively attended to, but subsequent cognitive processing is engaged to dampen their impact. Based on the different time courses of these effects, Taylor argued that a single theoretical mechanism was unlikely to explain both the mobilization and minimization elements of this hypothesis. If an underestimation of likelihood judgments for negative events can be attributed to motivational processes in future research, the current paper echoes Taylor (1991). Our argument would complement her time course argument, having shown the inherent inconsistency associated with a simultaneous over- and underestimation of negative events, thus prohibiting recourse to a common mechanism.

Although I have stressed that I do not wish to strongly endorse selective attention as a mechanistic explanation for the Severity effect or Wishful thinking, I did outline instances where I felt such an explanation were possible. One way in which, in reality, people might be able to lessen the impact of negative information is through biased information search (for a meta-analytic review see Hart, Albarracín, Eagly, Brechan, Lindberg, & Merrill, 2009), which would counter the Severity effect. Although in the extreme such a process would inevitably result in optimistic beliefs (see, e.g., Scherer, Windschitl, O'Rourke, & Smith, 2012, who demonstrated overestimates of the likelihood of positive outcomes over negative outcomes as a result of biased information search), once again the current conceptualisation demonstrates the separability of different and distinguishable elements of the process. Furthermore, although this might be a way in which UCO might co-exist with the Severity effect, it is less clear how it can explain the results from optimistic belief updating tasks, where participants are directly presented with negative information.

Where is the inconsistency within the current (Figure 1) framework?

One reason for focussing on the three optimism phenomena above was because of their different structures. Thus, in addition to exploring their relationship to the Severity effect, locating them within Figure 1 enabled a clarification of how these different phenomena relate to each other. More generally, however, as is clear from a consideration of the attention literature, there is not necessarily a paradoxical inconsistency between the simultaneous existence of an effect whereby both positive and negative outcomes are overestimated relative to neutral outcomes (wishful thinking and severity effects). There is, however, clearly an inconsistency between negative outcomes simultaneously being over- and underestimated relative to neutral outcomes. It has been argued elsewhere (Hahn & Harris, 2014) that egocentric processes suggest the term ‘optimism’ is a misnomer to describe the results of the comparative method, and the current analysis, suggesting that these results do not require reconciliation within a general framework for how utility affects likelihood estimates (Figure 1, bottom right panel), further underscores that point. For other methods, a different reconciliation will likely be required.

In terms of theories, Lench and colleagues’ (Lench, 2009; Lench & Bench, 2012, 2015; Lench & Darbor, 2014) Automatic Optimism hypothesis does not seem to have scope for the inclusion of a severity effect or therefore reconciliation in the terms of Figure 1. The Automatic Optimism hypothesis argues that positive and negative affect cue approach and avoidance motivation respectively. Approach motivation is satisfied by exaggerating an event’s likelihood of occurrence, whilst avoidance motivation is satisfied by decreasing one’s subjective judgment of an event’s likelihood of occurrence. The former is in line with Wishful thinking (Optimism 1), but the latter is clearly inconsistent with the existence of the Severity effect. This is not, however, the only possible relationship between approach-avoidance motivation and likelihood estimates. Rose (2009) prefers the Compatibility-

Incompatibility Account. There is no inconsistency with this account and the existence of any of the effects reviewed in this paper. The Compatibility-Incompatibility Account yields the prediction that approach motivation will increase the subjective likelihood of positive events because the approach system is most compatible with positive events (these are the events one approaches). Similarly, avoidance motivation will increase the likelihood of negative events. Note that this account does not suggest approach-avoidance as a mechanistic explanation for the effect of valence on likelihood estimates, but rather sees it as an independent factor.⁷ It is also of note that the Compatibility-Incompatibility account is consistent with findings in attention suggesting that participants are more distracted by negative distractors when in a negative emotional state and more distracted by positive distractors when in a positive emotional state (e.g., Lang, Bradley, & Cuthbert, 1990, 1997).

Negative outcomes underestimated relative to neutral outcomes.

Because a direct underestimation of negative outcomes relative to more neutral outcomes would be logically inconsistent with the framework advanced in the present paper (Figure 1, bottom right panel), it is worth considering the evidence for it from paradigms other than the comparative method (Optimism 2) and the update task (Optimism 3). Consistent evidence for such an effect has been inferred from tasks in which participants provide a binary prediction as to whether an event will or will not occur - a so-called ‘outcome prediction task’ (Krizan & Windschitl, 2007). Participants provide more predictions that a desirable outcome will occur than an undesirable outcome will (e.g., Irwin, 1953; see

⁷ The direct evidence for these accounts is limited and inconsistent, and has not been found where probability estimates have been elicited from participants. Lench (2009, Experiment 4) observed that an event rendered undesirable through evaluative conditioning was estimated as less likely to happen to the self (relative to the average person) under avoidance motivation than approach motivation. In contrast, Rose (2009, Experiment 2) observed *more* dichotomous ‘Yes, I will experience the event’ responses for negative events under avoidance motivation than approach motivation. No effects were found with direct probability estimates. Clearly, more work is required to better understand the results of these studies, the operationalisation of approach-avoidance motivation (operationalised in both these studies through arm flexion / extension), and its role in likelihood estimation.

Krizan & Windschitl, 2007, for a review). Outcome prediction tasks do not, however, directly assess likelihood estimates. Indeed, Windschitl, Smith, Rose and Krizan (2010) provided data suggesting that these results are best explained as demonstrating ‘biased guessing’ (on the basis of unbiased likelihood predictions) rather than biased likelihood estimates. Such results are therefore beyond the scope of the present paper. The following discussion focusses on tasks which elicited likelihood predictions from participants.

Krizan and Windschitl (2007, p. 101) concluded from their review that “unlike outcome predictions, subjective probabilities do not seem to be sensitive to the desirability of chance outcomes.” There are, however, some reported instances of such sensitivity in the literature, and I discuss these below.

Pruitt and Hoge (1965) presented participants with 24 flashes of light, which each came either from ‘Light A’ or ‘Light B.’ Participants estimated the likelihood that the next flash would be from Light A rather than Light B. On 80% of trials, a Light A flash was associated with a valenced outcome: lose 50 cents; lose 10 cents; gain 10 cents; gain 50 cents. Pruitt and Hoge reported a significant positive linear trend between value and likelihood estimates. Despite the significance of this trend, the descriptive statistics (presented in graphical form) suggest that the evidence for the negative outcome being underestimated relative to the neutral outcome is very unclear, with the -50 cents outcome appearing to result in the same mean likelihood estimate as the neutral outcome (see Harris et al., 2009, for additional critique of this paper).

Lench (2009, Study 1) observed lower comparative likelihood judgments for the exact same neutral event when it was paired with a negative image (snarling dog / man with a gun) versus when it was paired with a neutral image (electrical plug / truck) in an evaluative conditioning paradigm. One could argue, however, that such an effect is rational. Because

owning a white car is under personal control, the less desirable it is for me, the less likely I am (presumably) to own one. A similar method for manipulating the desirability of an outcome was used in Lench and Darbor (2014). Participants who were subliminally presented with negative affect words whilst reading about formaldehyde emissions subsequently rated the likelihood of exposure to formaldehyde emissions as lower than those in the control condition. Once again, however, it appears as though an alternative explanation could account for this result. Formaldehyde emissions are a real, but “not well-known” (Lench & Darbor, 2014, p. 571) hazard. The greater negative affect reported in response to this threat in the negative condition could result in an inference that it must therefore be a rare threat: ‘this is so bad, I must have heard about it. Except, I haven’t. It must therefore be rare, otherwise I would have heard about it.’ This highlights the difficulties of manipulating the severity of real-world events independently of their likelihood (see also, Weber & Hilton, 1990). All the findings reviewed in this section would be difficult to reconcile within either framework proposed in the bottom panels of Figure 1. The above critiques do, however, demonstrate that there are plausible alternative explanations for these results which require ruling out in future research before alternative frameworks are required.

Absolute optimism. Throughout this paper, I have focussed on the qualitative phenomena predicted by valence-based influences on likelihood estimates (e.g., positive = negative > neutral). In their review of the unrealistic optimism literature, Shepperd et al. (2013; see also Shepperd et al., 2015) include evidence suggesting that people’s likelihood estimates for negative events are lower than the objective reality (e.g., Weinstein & Lyon, 1999), and label such effects unrealistic absolute optimism. The degree to which these findings demonstrate an influence of valence on likelihood estimates is, however, difficult to assess. Shepperd et al. (2013, p. 398) state,

“it may seem odd to describe people as unrealistic in their estimates when they do not know the base rate. For example, a group on average may underestimate their risk of a radon gas problem simply because they are unaware that radon gas is a problem in their community. Yet, although the underestimation reflects erroneous beliefs, it is still unrealistic optimism. Likewise, unrealistic optimism is sometimes less clear in absolute risk judgments in part because it is obscured by erroneous beliefs about the actual rate in the population...The consequence is that people underestimate their personal risk for some events and overestimate their personal risk for others. Nevertheless, unrealistic optimism is likely to contribute to most or all risk judgments.”

In this quote, it is unclear what evidence from absolute optimism studies supports the final sentence. The remainder of the quote demonstrates the difficulties associated with establishing the effect of valence on likelihood estimates in such studies. Inconsistent patterns of results across different domains (e.g., Lichtenstein, Slovic, Fischhoff, Layman, & Combs, 1978; Rothman, Klein, & Weinstein, 1996) can all be driven by incomplete information (e.g., as a result of biased media coverage) that can drive judgment errors in pessimistic or optimistic directions for reasons unrelated to event valence.

Of course, the critiques laid out in this section might ultimately all be shown to be inconsequential. To date, however, the evidence for a general underestimation of the likelihood of negative events relative to neutral events – a result that would be especially problematic to conceptualise within Figure 1 – might, at best, be considered a work in progress.

Conclusions

At first pass, findings of optimism and the Severity effect constitute something of a paradox that has occupied this author's mind for some time. Lessons from distinct literatures (attention and word recognition) highlight those aspects of this seeming inconsistency that pose little difficulty for an integrative theory of likelihood judgments. In addition, a consideration of the different theories currently under discussion in those literatures allows an informative conceptualisation of three distinct sources of evidence for optimism.

Firstly, the framework (Figure 1, bottom right panel) enabled a clear explication of the descriptive relationship between the different methodologies employed in terms of how they related to the general question of whether positive or negative events' likelihoods are overestimated. Secondly, it was shown that, in this regard, there was no inherent inconsistency in simultaneous observations of both Wishful thinking (Optimism 1) and the Severity effect. Finally, the current framework led to an understanding of the important role for investigating neutral events in future theory development.

Shepperd et al. (2013) argued that it is important to consider different types of optimism separately. I agree with this assessment to the extent that different types of optimism are measuring separate things, or arise from different processes. The present discussion of the comparative method within the framework presented in Figure 1 illustrates this point. I argued that the seeming inconsistency of that result with such a framework is readily reconciled when one considers the potential for non-motivated, non-valence-dependent egocentric processes (e.g., Chambers et al., 2003) to account for these data. On such accounts, though, comparative optimism results should not represent a major part of a conversation interested in the general effect of outcome utility on likelihood estimates. Time will tell how asymmetric belief updating will best be reconciled, but the seemingly

pessimistic updating observed with positive events (Shah et al., in press) mirrors the seeming pessimism for rare positive events using the comparative method. Thus, a non-motivated process (e.g., Shah et al., in press) might subsequently also prove to be the best explanation for these results.

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List of Figures

Figure 1. Relating effects of emotional valence on word recognition times to hypothetical effects of utility on likelihood estimates. The left-hand panel illustrates the automatic vigilance account, whereby negative words are responded to slower than neutral or positive words (top left panel) because of their attentional privilege (middle left). Such an effect on likelihood estimates would be consistent with a severity effect (bottom left). The different lines recognise the potential for either a categorical or continuous relationship between negative valence and the construct of interest. The right-hand panel illustrates the motivated attention account, whereby both negative and positive words are responded to faster than neutral words (top right), because of their attentional privilege (middle right). Such an effect on likelihood estimates would be consistent with what Slovic (1966) termed an ‘it will happen to me’ effect.

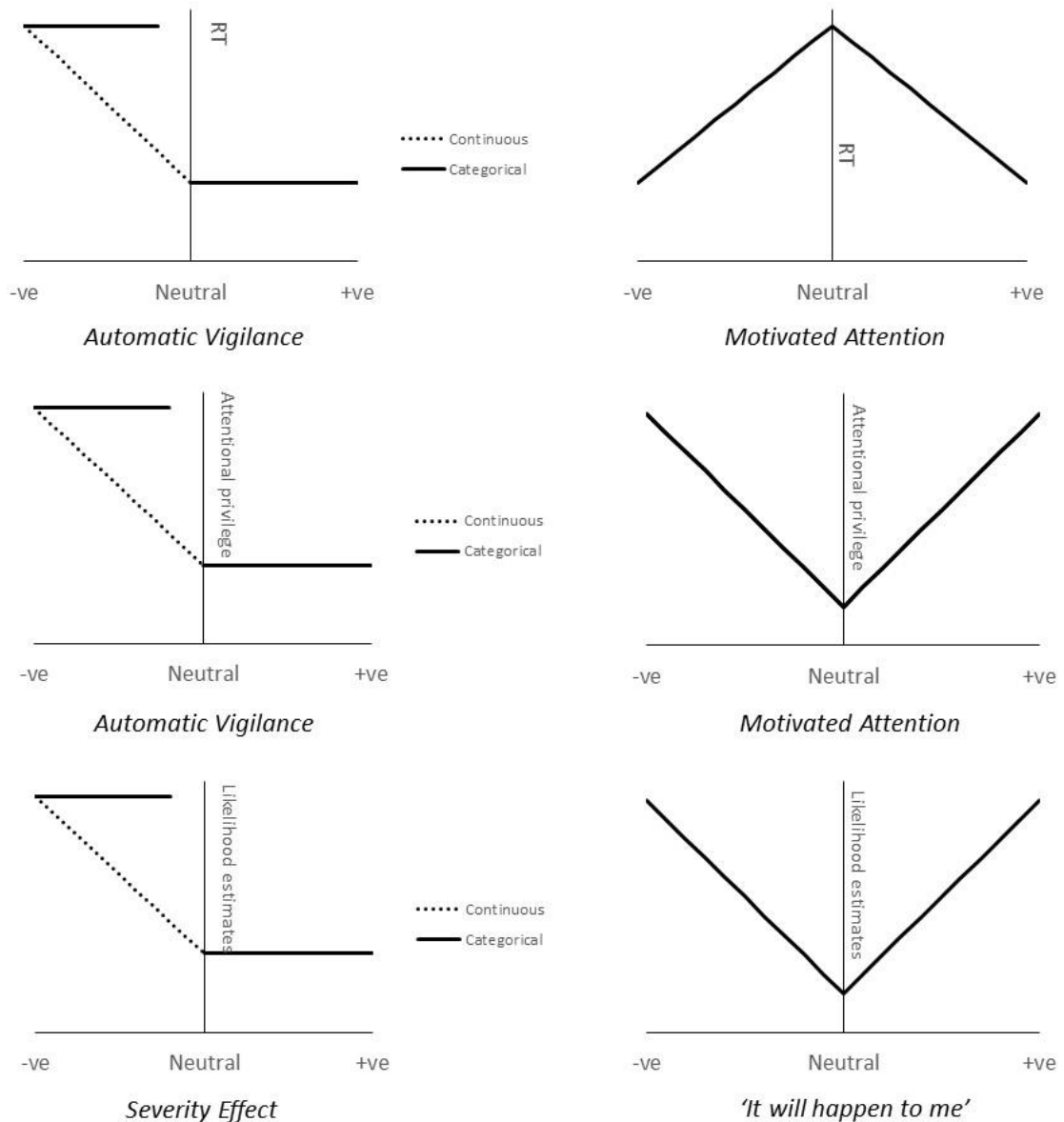


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