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The role of expectations in transformative experiences

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ABSTRACT

According to L. A. Paul, the subjective value of an outcome is normally assessed by running a cognitive model of what it would be like if that outcome were to occur. However, cognitive models, along with the expectations in which they result, are unreliable for application to transformative experiences because we cannot know what it would be like for an outcome to occur if we have never experienced it before. This paper argues that despite their unreliability, expectations are still important in the case of chosen and unchosen transformative experiences because expectations about an outcome can systematically influence the very experience of that outcome. More precisely, empirical research shows that affective experiences tend to assimilate to affective expectations. In turn, more positive affective experiences lead, *ceteris paribus*, to higher subjective value. Therefore, rational agents confronting transformative outcomes should form or cultivate positive/optimistic affective expectations since, all else being equal, that maximizes subjective value.

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1. Introduction

Laurie Paul's groundbreaking book, *Transformative Experience* (2014), has triggered immense echoes in academic philosophy and beyond. The book's main argument is simple: If you have never previously experienced the outcome of a given option, then (with some exceptions) you cannot rationally and authentically choose or decline either that option or any other option in the same choice set. This is because the yet-unexperienced outcome involves a transformative experience that can manifest in a twofold way. You have an epistemically transformative experience by learning what experiencing this novel outcome means to you. You may also have a personally transformative experience in which the novel situation changes your preferences. Both types of transformative experience make assessing

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the option's subjective value in advance impossible; the transformative character of the outcome prevents access to it.¹ Without access to this value, rational decision-making gets stuck.

Many authors have responded to this challenge regarding the transformative experiences that Paul introduces (e.g., Barnes, 2015; Bykvist & Stefánsson, 2017; Campbell, 2015; Dougherty et al., 2015; Kauppinen, 2015; McKinnon, 2015; Pettigrew, 2015, 2019; Reuter & Messerli, 2018; Sharadin, 2015). Most of the authors are primarily concerned about whether the transformative character of an outcome truly (always) bars us from assessing its subjective/overall value (or at least its valence) and, thereby, prevents rational decision-making. Kauppinen (2015), however, constitutes an exception. He is less interested in the transformative character of certain experiences than in why the subjective value per se is of such importance for rational decision-making. Accordingly, unlike the other authors, he focuses on the role of experience in rational decision-making more generally.

By concentrating on experience as well, the present paper explores a direction similar to Kauppinen's, yet takes another path. It analyses how experiences come about in the first place and whether the details of their genesis have potential consequences for transformative experiences. The following background led to this approach. In the past few years, a theory in cognitive science called *predictive processing*, which describes the brain as a probabilistic prediction machine, has become increasingly influential (Clark, 2013; Williams, 2020). According to this theory, the brain is not a passive stimulus-driven organ; instead, top-down processes – in other words, our predictions/expectations – co-create experience.² It follows that the experience of a transformative outcome partly depends on the phenomenal predictions we form regarding that outcome, a process that Paul (2014) calls *cognitive modeling*. This gives predictions new importance in both transformative decision-making and unchosen transformative experiences, even if (as Paul argues) we cannot form reliable predictions in such cases. More precisely, people frequently assimilate their affective experiences to their affective predictions. Therefore, rational agents confronting transformative outcomes should form or cultivate positive/optimistic affective predictions because these tend to promote more positive affective experiences and, thereby, higher subjective value.

This paper is structured as follows. Section 2 quickly recaps Paul's utility ignorance objection and discusses how several authors have replied to it. Section 3 more closely examines the role of cognitive modeling in the context of transformative experiences and presents the argument of this paper. Section 4 investigates the connection between affective experience and subjective value. Section 5 introduces predictive processing and its consequences

for experience. Section 6 looks at how expectations influence experience from an empirical perspective. Finally, section 7 discusses the normative implications of the previous findings for transformative experiences.

2. Paul's utility ignorance objection and responses to it

To begin with, a realist-deliberative understanding of decision theory underlies Paul's description of the challenges that transformative experiences pose to it (Pettigrew, 2019). In this understanding, utilities are real mental states that determine our preferences, at least in part. Moreover, not only the outcome of a choice but also the deliberation behind it are of interest. How rational decision-making should proceed within such an understanding of decision theory is straightforward. You take one of the options within your choice set, assess the utility of each of its possible outcomes, multiply each of these utilities with the probability of the corresponding outcome, and add up these numbers. This gives you the expected utility of that option. You do the same for all other options and ultimately choose the one (or one of those) with the highest expected utility.

In this procedure, assessing an outcome's utility is the critical part with regard to transformative experiences. Paul (2014) says that this normally happens via cognitive modeling, which means running a mental simulation of what that outcome occurring would be like. However, such cognitive modeling is not possible in the face of transformative experiences because we cannot know what a heretofore unexperienced outcome would be like. Put differently, we do not have access to the subjective value of an outcome that involves a transformative experience. As a result, we can neither assess such an outcome's utility nor, consequently, evaluate the expected utility of the option as a whole.

Despite this challenge that transformative experiences pose to decision theory according to Paul, there are several approaches that claim to make (at least some cases of) rational transformative decision-making possible. For example, Paul (2014) herself argues that an agent facing transformative experiences can very well make a rational decision by revising the relevant outcomes. Instead of asking herself whether she wants to choose a transformative option for the sake of the experience it involves, she can ask herself whether she wants to choose it for the sake of having had the experience it involves. As Paul writes, "[t]he relevant subjective value, then, is the revelatory value of discovering the intrinsic nature of the experience" (p. 38). With this revelatory approach, while the experiential value of a transformative experience cannot ground the rational choice of an option that involves it, its revelatory value can do so.³ In other words, the decision

problem can be revised so that the epistemically inaccessible phenomenal character of a transformative experience is no longer decisive for the choice as a whole.

Other approaches to rational transformative decision-making also try to circumvent the unknown subjective value of a transformative experience. Reuter and Messerli (2018) identify the decision situations in which knowing a transformative option's nonsubjective values is sufficient to enable rationally choosing or declining it. McKinnon (2015) argues that certain transformative decisions resemble a "freeroll" in poker, which means that you cannot lose but might win. In these cases, regardless of the subjective value of the transformative option, it cannot be worse than the value of not choosing the transformative option. Regarding life choices, Kauppinen (2015) asserts that nonexperiential consequences of an outcome are typically more important than experiential ones. Therefore, making life choices should have not an "experience-regarding" basis but, rather, what he calls a "story-regarding" basis.

3. Cognitive modeling in transformative experiences

These approaches all share the irrelevance of a transformative experience's inaccessible subjective value to rational decision-making. Consequently, in such situations, our cognitive modeling restraints no longer pose a problem. Therefore, does cognitive modeling become redundant? The answer to this question depends on two follow-up questions. First, what exactly does Paul (2014) mean by saying that we cannot perform cognitive modeling in the context of transformative experiences? In fact, the implication she intends is not that such cognitive modeling is impossible but that its results are unreliable. For example, regarding whether you should participate in a revolution for the sake of its potentially desirable outcomes, Paul (2014) writes: "[Y]ou cannot use your simulations of what it would be like after the revolution as evidence for a decision about whether to participate" (p. 56). Here, cognitive modeling is still possible but simply not reliable. Likewise, someone without children can very well run a mental simulation of what it would be like to become a parent. Yet, the anticipated value of the resulting experience will match the actual one only by chance. As Paul (2015b) puts it:

The claim that having a child is epistemically transformative does not entail that, if you ascribe a value to what it will be like for you to have a child before you've actually had a child, the value you ascribe will be incorrect. You might get lucky. (p. 161)

Therefore, the problem is not that confronting a transformative experience prevents performing cognitive modeling. The problem is that whether our cognitive model will be correct is epistemically indeterminable.

The second question involves whether our cognitive models, unreliable as they are, can nevertheless systematically influence the subjective value of a transformative experience. If they cannot, our cognitive models of transformative outcomes are truly redundant, being both unreliable and without effect. However, if they can exert it, such influence would have the normative implication that when facing transformative experiences, we should form those expectations that maximize utility. This is due to the following reason: The manner of forming rational beliefs and expectations is normally subject to epistemic criteria, often Bayesianism in epistemology and decision theory (cf., Talbott, 2008). Accordingly, rational agents cannot freely form their expectations but must follow Bayesian principles, which should maximize expectations' accuracy. Paul (2014) basically endorses this link between rationality and Bayesianism as well, discussing hierarchical Bayesian models as a way to form rational expectations about transformative outcomes. But, then again, she argues that at least in the case of major transformative experiences (e.g., becoming a parent), Bayesianism cannot surmount the epistemic blockade that such experiences involve (Paul, 2014, p. 164). Therefore, in these cases, the accuracy of "how-it-is" expectations (i.e., cognitive models) is epistemically inaccessible, leaving no epistemic rule that prescribes which (if any) expectations to form. Put differently, Paul suggests that an epistemic (e.g., Bayesian) point of view cannot assess any possible expectations about a (major) transformative experience. Epistemic rationality is blocked. Hence, forming expectations about such experiences should take place on the grounds of practical rationality which, in the context of decision theory, means utility maximization.

On the one hand, this would be relevant for rational routes to transformative decision-making, such as those Paul (2014), Reuter and Messerli (2018), McKinnon (2015), and Kauppinen (2015) propose. Even if we can rationally choose a transformative option for the sake of its nonsubjective value, we still want its subjective value to be as high as possible (cf., Paul, 2014, p. 26). Thus, if, *ceteris paribus*, expectation X tends to promote a higher subjective value than expectation Y, we should form X and not Y. On the other hand, this normative implication would also matter in the case of involuntary transformative experiences, such as illness, accidents, and personal loss (cf., Carel & Kidd, 2020; Hole & Selman, 2020). In such situations, our expectations of how these situations will progress may be the only things left to our choice. Moreover, if the progression that expectation X shapes, *ceteris paribus*, involves a higher subjective value than the progression that expectation Y shapes, we should form X and not Y.

The rest of this paper demonstrates that especially our affective predictions do, indeed, systematically influence an outcome's subjective value.⁴ The main argument is as follows:

- (1) Positive affective experiences lead, *ceteris paribus*, to a (transformative) outcome having a higher subjective value than neutral or negative affective experiences.
- (2) Positive/optimistic affective predictions lead, *ceteris paribus*, to more positive affective experiences than neutral or negative/pessimistic affective predictions.
- (3) If (1) and (2), then positive/optimistic affective predictions lead, *ceteris paribus*, to a (transformative) outcome having a higher subjective value than do neutral or negative/pessimistic affective predictions.
- (4) If affective predictions X lead, *ceteris paribus*, to a transformative outcome having a higher subjective value than the other possible affective predictions, rational agents should form or cultivate affective predictions X.
- (5) If (3) and (4), then rational agents should form or cultivate positive/optimistic affective predictions when confronted with transformative outcomes.

We begin with the connection between the affective experience to which an outcome leads and its subjective value.

4. Subjective value and affective experience

Paul (2014, 2015a) emphasizes that subjective values are neither merely values of pleasure and pain nor generally reducible to sensory phenomenology. Instead, they can also comprise values arising from nonsensory content, such as whether an experience is veridical. Nonetheless, Paul never denies that the phenomenal sensory character of an experience is important for its subjective value. Consequently, when we use cognitive modeling to assess a potential outcome, we also (or even mainly) form sensory predictions. These involve two facets: a prediction about the exteroception (perception of the outer world) accompanying an outcome and a prediction about the concomitant interoception (perception of the inner world).⁵ Importantly, the hedonic value of a given sensory phenomenology is determined by the affective experience that it comprises and is therefore a co-product of interoception.

To illustrate the basic idea, consider the following example. If you mentally simulate drinking coffee, your exteroceptive prediction will include the taste of the coffee, whereas your interoceptive prediction will include the affective reaction that drinking the coffee triggers. Regarding the taste of the coffee, you might predict a mixture of sour and a little bitter with a touch of sweetness. Your interoceptive prediction might be that the coffee will be delicious, that drinking coffee will make you feel pleasantly vivified,

or simply that drinking coffee will lead to an overall positive affect.⁶ Your actual affective reaction to drinking the coffee, which (of course) connects to the actual taste experience, determines its hedonic value, which in turn contributes to the subjective value of the experience. We can thereby assume that a more positive affective reaction leads, *ceteris paribus*, to a higher subjective value since the more positive an affective reaction is, the higher is its hedonic value.

We next examine the possibility that our predictions of what a certain outcome would be like influence the very experience of it when it occurs. In so doing, we first discuss an increasingly influential theory in cognitive science that supports this notion, namely, predictive processing.

5. The influence of prediction on experience: Theoretical view

Predictive processing is a Bayesian approach to the brain. It describes the brain as a probabilistic prediction machine that continually strives to minimize the mismatch between sensory inputs and self-generated predictions about these sensory inputs (Clark, 2016; Friston, 2010; Friston et al., 2017; Hohwy, 2013). To illustrate what this means, let us first look at a “traditional” approach to perception, which essentially involves a process of bottom-up feature detection. Here, the visual cortex, for example, is seen as a hierarchy of neural feature detectors, with neural population responses that are driven by bottom-up stimulus features (Egner et al., 2010). This implies that the brain perceives the world in a passive and stimulus-driven manner. It takes energetic inputs from the senses and turns them into a coherent percept by a kind of stepwise buildup, starting with the simplest features and moving to those more complex until the percept is complete (Clark, 2015).

With respect to this traditional approach to sensory processing, predictive processing performs what Clark (2015) calls a kind of “Bayesian flip.” Instead of building a model of what is out there based on bottom-up sensory input, the brain tries to predict the bottom-up sensory input from its best models of what is likely to be out there (Hohwy, 2007, 2013). In this way, percepts originate from a recurrent cascade of top-down predictions that involve probabilistic expectations that are mostly subpersonal and hierarchically organized (tracking features at different spatial and temporal scales; Clark, 2015; Wiese & Metzinger, 2017). These expectations are about the present nature and state of the world as shown via the driving sensory input. It is this key function of top-down predictions that enables the brain to cope with noisy and ambiguous sensory inputs – for example, recognizing a song in a loud pub. So, to put it another way, top-down predictions involve the brain’s expectations of what is “out there” in light of its prior knowledge about the world and the momentary context. These

predictions are then combined with the driving sensory input in order to attain better guesses about the signal source. In the process, the sensory input gets compared to a cascade of downward predictions. Possible mismatches that emerge from these comparisons send forward prediction error signals. Such prediction error signals then nuance/change either the prediction or (via action) the sensory input until there is a match and the sensory input is accommodated, meaning that prediction errors are minimized. The whole process runs simultaneously and steadily across multiple levels of a processing hierarchy (Clark, 2015, 2016).

We see that a prediction error can be handled in two ways. In some cases, the brain alters its predictions and adjusts them to the sensory input, updating its generative model of the world; this is called perceptual inference. In other cases, the brain sticks to its original prediction and acts on the world in such a way that the sensory input becomes consistent with the prediction; this is called active inference (Pezzulo et al., 2015). In the face of a prediction error, the one that applies depends on the assigned precision of the prediction and the sensory input. Clark (2015) writes that the use of the acquired generative model “is subject to a constant kind of second-order assessment (known as ‘precision estimation’) that determines the weighting assigned to specific predictions at all levels of processing and to different aspects of the incoming sensory signal” (p. 5). Thereby, these weightings indicate the varying reliability, in context, of divergent aspects of the generative model and the sensory inputs currently available.

For example, say you are hiking in the backcountry of Australia. You know that snakes inhabit this area, and you are familiar with their appearance. All of a sudden, you spot something long and winding on the ground. Even though it is actually a stick, you initially perceive it as a snake, a result of top-down predictions of high precision in the current context (active inference). But, as time goes by, your bottom-up sensory input gets increasingly precise until, at some point, your prediction of a snake no longer overrides it (perceptual inference). In other words, the reliability of the driving sensory signal has become too high to uphold the prior prediction (Ongaro & Kaptchuk, 2019).

This example should not imply that adjusting predictions to the sensory input always occurs as soon as it is no longer noisy or ambiguous. Most obviously, despite sensory input that is not noisy, optical illusions do not disappear even when we know they are illusions. Von Helmholtz (1867), who studied such illusions, has already described them as the product of unconscious inferences, and ample evidence shows that they actually depend on prior experience (e.g., for the Ponzo-illusion, see, Brislin & Keating, 1976; Leibowitz & Judisch, 1967). This demonstrates that the ability of top-down processes to influence perception is not a new idea. Nevertheless, the novel contribution of predictive processing is that it very

strongly emphasizes the permanent influence of top-down processing and prior knowledge on perception (Wiese & Metzinger, 2017). Accordingly, perception and cognition appear profoundly unified and continuous. Importantly, this includes not only exteroception but also interoception. Various models view subjective emotions/affects and even conscious presence as a manifestation of interoceptive predictive processing (Barrett, 2017; Barrett & Simmons, 2015; Seth & Critchley, 2013; Seth et al., 2012).

To summarize, a central assumption of predictive processing is that our expectations regarding a certain outcome can influence the experience of that outcome. The next section investigates this issue from an empirical perspective.

6. The influence of prediction on experience: Empirical view

We begin our empirical investigation with an analysis of the experience of food. Deciding whether or not to eat durian is a famous example in the literature of transformative experiences (e.g., Collins, 2015; Dougherty et al., 2015; Kauppinen, 2015; Paul, 2014). The durian fruit has a foul smell and a highly unique taste. Thus, Paul argues that if you have never eaten durian, you cannot know the subjective value of eating it. Consequently, your cognitive modeling is impeded or, more precisely, does not lead to a reliable prediction. But as the previous section suggests, your unreliable expectations might nevertheless affect your actual experience of eating durian.

While no study has examined the impact of predictions on the experience of eating durian, plenty of studies reveal a connection between receiving information about food and one's experience of eating that food (for a review, see, Piqueras-Fiszman & Spence, 2015). For example, Siegrist and Cousin (2009) found that giving participants positive (negative) information about a wine they were going to taste increased (decreased) how much they liked it, compared to control groups.⁷ The authors infer from these findings that interoceptive predictions that the wine critique manipulated promoted a corresponding affective experience, which, in turn, also influenced the taste experience (e.g., if participants thought that the wine would taste rather bad, they looked for pertinent exteroceptive cues, such as pronounced sourness). Yeomans et al. (2008) demonstrate that labeling a pinkish-red ice cream with a smoked-salmon flavor as simply "ice cream" decreased its pleasantness, compared to labeling it as a frozen savory mousse. The authors argue that this is because the ice-cream-label group had formed the exteroceptive prediction of tasting sweet berry-flavored ice cream, inducing the interoceptive prediction that it would be delicious. This triggered a strong disconfirmation and, thereby, a "dislike" response when they discovered its actual taste. In contrast, the frozen-savory-mousse-label

group had formed more accurate exteroceptive and concomitant interoceptive predictions, so they were better prepared for and less disappointed in the ice cream's actual taste.

These two examples provide the following insight: If the discrepancy between expectations and sensory input is not too large, an assimilation effect will occur. Siegrist and Cousin (2009) found such an effect in their study, where the same wine was perceived as either better or worse than other groups perceived it, depending on prior information. If, however, expected and actual sensory inputs are very different, a contrast effect will ensue, as the study of Yeomans et al. (2008) shows, where the disconfirmed exteroceptive prediction of sweet, fruity ice cream led to a strong contrast effect and consequent dislike and rejection.⁸

The idea of an assimilation/contrast effect, which will be crucial for the rest of this paper, can be connected with predictive processing (Piqueras-Fiszman & Spence, 2015). In the case of the assimilation effect, bottom-up sensory input matches top-down predictions quite well, leading to a rather small prediction error. This prediction error then gets minimized via active inference, i.e., adapting the sensory input to the prediction. For example, Woods et al. (2011) gave participants lying in an MRI scanner either normal or 50% diluted orange juice two seconds after a visual text cue stated “very sweet” or “less sweet.” The purpose of the cue was to influence the participants' exteroceptive predictions. The authors found that expecting a very sweet drink but getting a less sweet one increased the reported sweetness and bolstered activity in the primary taste cortex, compared to receiving the same drink without this expectation. Thus, it seems that expectations modulated basic taste perception. In turn, this modulation could be explained by means of active inference, suggesting that activity in the primary taste cortex was bolstered so as to match the prior exteroceptive prediction and thereby minimize prediction error. However, when the prediction error is rather large, the noticeable disconfirmation of expectations leads to a contrast effect, and the driving sensory signal receives high reliability. In this case, the brain minimizes the prediction error by adjusting its prediction to the sensory input.

Applying these findings to the durian example suggests that prior evaluative information – for instance, in the form of testimony – can directly manipulate affective predictions and, thereby, the affective experience of eating durian. Alternatively, an agent might also steer her own affective predictions in a certain direction. Provided that the difference between the bottom-up sensory input and the top-down affective predictions is not too large, the actual affective experience assimilates to the predicted one. If the difference is too large, a contrast effect may ensue instead. In addition, descriptive exteroceptive information about the taste of durian that an agent receives (or does not receive) influences her exteroceptive predictions. In turn, these can

indirectly affect the hedonic value of eating durian as different taste experiences can lead to different affective reactions. Again, whether there is an assimilation or contrast effect depends on the discrepancy between exteroceptive (and consequential interoceptive) predictions and sensory input.

If we leave the durian example and consider transformative experiences more generally, we realize that, often, exteroceptive predictions are secondary or unavailable. (1) They are secondary because major transformative experiences primarily transform our interoceptive and not our exteroceptive experience. For example, many nonparents also know what a child sounds, looks, and smells like and what it feels like to hold a child from a tactile perspective. Yet, they do not know how it feels to be a parent. (2) The predictions are unavailable because some experiences' transformative character completely blocks exteroceptive predictions. For example, if Mary has always been in a black and white room, she cannot imagine what red looks like. As a consequence, she can form neither a well-informed nor a less well-informed exteroceptive prediction. Conversely, (unreliable) interoceptive predictions about affective experiences that accompany certain outcomes can always be formed. For instance, Mary can predict that seeing red for the first time will make her excessively enthusiastic or – a less concrete prediction – that it will lead to an overall positive affect. From (1) and (2), it follows that when considering transformative experiences more generally, we should concentrate on examining the influence of affective predictions on affective experience. This leads to the following question: which affective predictions, *ceteris paribus*, promote positive affective experiences?

We begin by noting that from a predictive processing perspective, there is no such thing as having no affective expectations (Clark, 2016), leaving three basic options, namely, having negative, neutral, or positive affective expectations. The rationale behind forming negative affective expectations is that if we expect the worst, we can almost only be positively surprised. This could promote a contrast effect causing affective experiences to be more positive than they would have been with neutral or positive affective expectations. But this strategy could also backfire if an assimilation effect ensues, which would lead to affective experiences more positive than expected but still less positive than with other affective expectations. The situation is precisely the reverse in the case of positive affective expectations. At best, such expectations trigger an assimilation effect and, thereby, promote positive affective experiences in the face of a neutral or even a negative transformative outcome. Yet, they can also evoke disappointment if the discrepancy between affective expectations and affective experience is too great. The resulting contrast effect would then promote negative affective experiences – more negative than if affective expectations had been negative or neutral. Finally, the strategy of forming neutral affective expectations leads to results somewhere between the other two alternatives.

As might become obvious, which strategy more successfully promotes positive affective experiences depends on how likely assimilation effects are, relative to contrast effects. If people mostly assimilate their affective experiences to their affective expectations, it is good to have rather positive affective expectations. However, if discrepancies between affective expectations and affective experience quickly lead to a contrast effect, it is better to have negative affective expectations. Ultimately, neutral affective expectations are optimal somewhere between these two conditions.

Let's consult empirical studies that investigated the impact of affective predictions on affective experience. We begin with experimental laboratory studies. On the one hand, ample evidence shows that affective experiences assimilate to manipulated affective expectations (Berkowitz & Thome, 1987; Gaab et al., 2019; Hodges et al., 2000; Horne et al., 2020; Klaaren et al., 1994; Southworth & Kirsch, 1988; Tondorf et al., 2017; Wilson et al., 1989). These studies examined manifold affective states that included distress, fear, negative moods, positive moods, humor, amusement, and positive affect more generally. On the other hand, only a few studies found that under some circumstances, affective experiences contrasted with manipulated affective expectations (Geers & Lassiter, 1999, 2002). The instances of contrast involved either people instructed to analyze information in a very fine-grained manner or people generally said to be on the watch for discrepancies anyway. So, from a predictive processing perspective, these people assigned high precision to the sensory input, promoting perceptual inference and, thereby, a contrast effect. Apart from these two specific groups of people, the studies also found assimilation effects. Therefore, in experimental studies, assimilation effects were more often found than contrast effects, which might indicate that they are generally more common.

Another branch of research – placebo studies – appears to support the hypothesis that affective experiences more often assimilate to than contrast with affective expectations. Countless research projects have examined how expectations influence placebo effects – for example, in the case of placebo analgesia (see, Forsberg et al., 2017; Price et al., 2007). Generally, these studies conclude that positive expectations regarding treatment outcomes (including affective expectations) contribute to placebo analgesia (Bingel, 2020).⁹ In turn, negative expectations (co-)drive unwanted side effects in placebo groups, so-called “nocebo effects” (Bingel, 2014, 2020; Colloca & Finniss, 2012). Therefore, assimilation effects of both positive and negative expectations lead to comparatively more or less experienced pain. Since pain also has an affective component (cf., Fernandez & Turk, 1992; Melzack & Wall, 1965), such expectations also lead to comparatively more or less positive affective experiences.

In line with these findings, whether people are basically optimistic or pessimistic also affects the placebo response. From a theoretical point of view, optimism should accompany the placebo response because optimism generally implies positive expectations about future outcomes (cf., Alarcon et al., 2013; Goodin & Bulls, 2013; Scheier & Carver, 1985). Conversely, we should associate pessimism with a nocebo response since it involves negative expectations about future outcomes. Empirical findings support these theoretical assumptions. While optimism correlates with lower pain sensitivity (Goodin & Bulls, 2013) and better placebo analgesia response (Geers et al., 2007, 2010), pessimism correlates with the nocebo response (Corsi & Colloca, 2017).

However, does this apparent tendency toward assimilation effects that (rather trivial) experimental laboratory studies and placebo studies suggest also apply to the present paper's main subject, namely, (major) transformative experiences, such as becoming a parent? Unfortunately, no studies exist where experimenters manipulated expectations of becoming parents and later assessed whether this manipulation had any effect on their experience. Therefore, we can only look at correlational data to investigate how affective expectations connect with affective experience in such cases. If the stated hypothesis that assimilation is more likely than contrast is true, we should find a positive correlation between affective expectations and affective experience, as well as optimism and affective experience.

The pattern that the data reveals regarding becoming parents is compatible with these projections. First, pregnant women's expectation of labor pain positively correlates with their experienced labor pain and their postpartum-pain perception (Aksoy et al., 2016; Green et al., 1990; Slade et al., 1993). Moreover, expecting less positive emotion, more negative emotion, less control, and less support during birth positively relates to the actual birth experience (Ayers & Pickering, 2005; Green et al., 1990; Van Bussel et al., 2010). Second, antenatal expectations about parenthood positively correlate with parental experience (Coleman et al., 1999; Wylie, 1979). Additionally, optimism negatively relates to antenatal and postnatal depression and positively relates to improved birth outcomes (Evans & Bullock, 2012; Lobel et al., 2000; Robakis et al., 2015).

Again, it has to be emphasized that these correlational findings do not demonstrate that positive affective expectations and optimism *promote* positive affective experiences. Still, they are consistent with such a causal relationship, so some authors have already suggested that expectations about birth and parenthood might have self-fulfilling effects (e.g., Green et al., 1990; Wylie, 1979). Ultimately, aside from becoming a parent, a positive correlation between expectations/optimism and experience also characterizes other major transformative experiences, such as adverse national events (Arampatzi et al., 2020; Fredrickson et al., 2003) or personal

diseases (Fournier et al., 2002; Pinquart et al., 2007). All in all, empirical studies suggest that affective experiences tend to assimilate to affective expectations, and thus, positive affective expectations tend to promote positive affective experiences.

A final note: So far, we have exclusively examined how expectations influence an occurring transformative experience and, thereby, the utility it yields. However, expectations can yield utility before the transformative experience even occurs (Loewenstein & Molnar, 2018; Molnar & Loewenstein, 2021). For example, expecting that becoming a parent will be fulfilling can lead to pleasant anticipation, whereas expecting that becoming a parent will be mainly stressful can lead to anxiety. These expectations and the consequent emotions lead to so-called anticipatory utility. Therefore, compared to negative or neutral expectations, positive affective expectations cannot only increase derived utility indirectly, by influencing the actual transformative outcome, but also directly, by increasing anticipatory utility. However, as the focus of the present paper lies on expectations' influence on how a transformative outcome manifests, we do not discuss anticipatory utility further.

7. Normative implications

On the one hand, we know that positive/optimistic, neutral, and negative/pessimistic affective predictions about an outcome can lead to different subjective values for that outcome. Moreover, in the case of transformative experiences, there is no epistemic rule that prescribes which of these affective predictions we should form since we are epistemically blocked from assessing their accuracy.¹⁰ Hence, expectations about such experiences should form on the grounds of practical reasons (remember, having no affective predictions is impossible, so we would form them either way). On the other hand, decision theory asserts that agents should maximize utility (cf., Paul, 2014, p. 21). Since an outcome's subjective value contributes to its utility, agents should, *ceteris paribus*, maximize the subjective value of an outcome. From these two points, it follows that rational agents should form those affective predictions that, *ceteris paribus*, maximize the subjective value of a transformative outcome. In combination with the empirical findings that the previous section presents, this leads to the following normative implication regarding transformative experiences: Confronting a transformative experience, you should form positive/optimistic affective expectations because your affective experiences tend to assimilate to your affective expectations; thus, positive/optimistic affective expectations tend to promote positive affective experiences. In turn, *ceteris paribus*, the more positive the affective experience accompanying an outcome is, the higher is the outcome's subjective value.

Despite this general recommendation to form positive/optimistic expectations, assuming that this always does the trick would be naive. As Geers and Lassiter (2002) show, inducing positive expectations in people who generally had negative expectations and, thus, tended toward pessimism did not cause them to experience something not-so-positive as more positive.¹¹ For these people, positive expectations were actually counterproductive because they triggered a contrast effect. It is highly doubtful that a contrasting pessimist can become an assimilating optimist in a snap just by actively changing her personal expectations from negative to positive. After all, nonconscious predictions are highly influential in predictive processing (Clark, 2016) and unlikely to be instantly, actively alterable. Therefore, the establishment of an optimistic mind-set is most likely a prolonged process, but it seems worth undertaking.

In a wider sense, this implies that a rational way to approach transformative experiences is to cultivate optimism as a general attitude toward life.¹² This favorable perspective on optimism aligns with a rather recent development in psychology. Psychologists had long believed that having positive expectations about one's future was deceptive, counterproductive, and maladaptive because life was generally difficult and full of disappointments (Peterson, 2000). However, the emergence of optimism as a popular research topic has changed this view. Nowadays, most psychologists acknowledge the beneficial effects that optimism has on one's psychological and physical well-being (Alarcon et al., 2013; Scheier et al., 2021). Fortunately, psychological research also demonstrates that optimism and concomitant positive future expectations, positive affect, and well-being can be promoted, with the Best Possible Self (BPS) exercise being the most common and effective intervention (for meta-analyses, see, Carrillo et al., 2019; Heckerens & Eid, 2021; Malouff & Schutte, 2017).¹³ Therefore, cultivating optimism appears feasible (see, also Seligman, 2006) and might ultimately enable us to approach transformative experiences, such as becoming a parent, with optimistic affective predictions on both the conscious and the nonconscious level. This way, we can positively influence the unknown subjective values of such experiences. This conclusion also appears in the last sentence of the meta-analysis by Evans and Bullock (2012): "Optimism holds promise as a modifiable variable that could help protect pregnant women from the development of depression in a culturally-acceptable, easily-accessible, and effective way" (p. 359).

Addressing several objections and limitations remains. First, the circumstance that cultivating optimism tends to promote positive affective experiences does not imply that this strategy prevents (or enables ignoring) all negative affective experiences. Instead, when confronted with adverse outcomes, optimists are better able to cope with them (for a meta-review, see, Nes & Segerstrom, 2006). This means that, initially, an optimist's affective

experiences might be as negative as those of a pessimist. However, the former adapts more quickly than the latter to new situations and, thereby, improves her affective states sooner. This is because the attributional style of optimists explains negative outcomes in terms of causes that are external to the self, time-limited, and narrow in their effects. Conversely, pessimists' attributional style explains negative outcomes in terms of causes that involve an aspect of the self, persist into the future, and influence a broad range of events (Scheier et al., 2001).

Second, this paper's normative implication that rational agents should form or cultivate positive/optimistic affective expectations does not specify *how* positive/optimistic these expectations should be. One might suggest a constant positive relationship between expectations and experiences. However, this is most likely not the case; instead, there is most likely a tipping point beyond which increasing the expectations' level of positivity or optimism becomes counterproductive. For example, overly optimistic expectations regarding motherhood appear to be associated with poorer psychological adjustment (Harwood et al., 2007; Robakis et al., 2015). Consequently, this paper can only point in the general direction toward which our formation and cultivation of affective expectations should be oriented. It cannot indicate exactly what those affective expectations should be.

Third, one might object that actively forming or cultivating affective predictions with the aim of attaining more positive affective experiences might cause the assimilation effect to disappear. In other words, the assimilation effect occurs only if you are not aware of it. This would more or less nullify this paper's normative implication. However, ample evidence shows that, for example, placebo analgesia works even under full disclosure as long as people receive a plausible rationale for the effectiveness of placebos (see, Locher et al., 2017). In the same way, actively forming or cultivating positive/optimistic affective expectations to take advantage of an assimilation effect should work if people have a plausible rationale (e.g., predictive processing) for the effectiveness of doing so.

Fourth, one might object that whether you can form optimistic affective expectations regarding a given outcome, such as becoming a parent, strongly depends on your circumstances. For instance, a woman with a loving partner, secure income, and a supportive family finds it much easier to form optimistic affective expectations regarding motherhood than a woman who lacks these preconditions. However, as mentioned above, cultivating an optimistic mind-set does not mean that all possible adverse outcomes will turn out positive, but they do tend to turn out less negative than they would without an optimistic mind-set. Therefore, although the circumstances surrounding a transformative experience

influencing the resulting affective experience remains true, nevertheless, optimism promotes positive affective experiences independently of the fortunate or unfortunate nature of those circumstances.

8. Conclusion

The argument this paper presents does not consider whether an agent can make a transformative decision rationally. Instead, it reflects on the kind of affective expectations an agent should form when confronted with chosen or unchosen transformative experiences. This is important because even though expectations about a transformative experience are epistemically unreliable, they can still systematically influence its subjective value. More precisely, affective experiences tend to assimilate to affective expectations; for this reason, positive/optimistic expectations tend to promote positive affective experiences. In turn, positive affective experiences accompanying an outcome contribute to its hedonic value, which, *ceteris paribus*, also increases its subjective value. Therefore, rational agents should form or cultivate positive/optimistic affective expectations because such expectations maximize the subjective value of transformative outcomes.

Notes

1. Personally transformative experiences might also prevent you from accessing an outcome's nonsubjective value.
2. This paper uses the terms "prediction" and "expectation" interchangeably.
3. While Paul's approach has been criticized (see, Bykvist & Stefánsson, 2017; Kauppinen, 2015), this paper does not scrutinize whether her approach or the other approaches to be discussed in this section actually work.
4. For simplicity, I partition the set of all possible affective predictions into three subsets (positive/optimistic affective predictions; neutral affective predictions; negative/pessimistic affective predictions) and consider and compare only these subsets and not particular affective predictions.
5. Here, we assume that emotions/affects and pain are part of interoception (cf., Barrett, 2017; Craig, 2015).
6. Keep in mind that this does not imply that the prediction will be accurate if you have never had coffee before and, thus, are confronted with a transformative experience. This is an important difference from such authors as Sharadin (2015), who maintain that agents can usually form accurate predictions about the valence of the subjective value even of transformative experiences.
7. The manipulation had no effect on liking if it occurred after the tasting, which excludes a self-presentation effect, whereby participants might have attempted to be in line with critics' evaluations.
8. The direction of disconfirmation (more positive or more negative than expected) may also be of importance. For example, prospect theory (Kahneman & Tversky, 1979) says that losses loom larger than same-sized gains. Consequently, negative disconfirmation should be more likely to lead to a contrast effect than positive disconfirmation.

Yet, findings on this topic suggest that asymmetric effects can also flip; whether they do probably depends on several factors, such as information provided, the product being tested, and the test person herself (Cardello, 2007).

9. Moreover, there are predictive processing accounts of placebo analgesia (Büchel et al., 2014; Ongaro & Kaptchuk, 2019).
10. Higher-order facts may be able to partially raise this epistemic blockade and, thereby, rule out some affective predictions. Yet, they cannot raise the epistemic blockade completely (cf., Paul, 2014).
11. This finding implies that in case of pessimists, rather negative affective expectations appear to maximize an outcome's subjective value.
12. This is a similar conclusion to that of Arvan (2015), who proposed that the only rational way to approach transformative experiences is to become resilient people. In so doing, Arvan referred to resilient people mainly as people who do not “over-plan” their lives and who understand that beyond a certain limit, life must be accepted as it comes. But this is only one possible source of resilience. Optimism has also repeatedly been identified as a source of resilience (e.g., Arampatzi et al., 2020; Segovia et al., 2012). As a consequence, we can say that the cultivation of optimism makes us more resilient.
13. BPS is often implemented as a one-time intervention, leading to mere short-time effects. However, there are also week- or even month-long interventions with more long-term effects (e.g., Lyubomirsky et al., 2011; Meevissen et al., 2011).

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