

Peak-End Effect in the Workplace: a strategic option for firms?

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July 2017

Abstract

The peak-end effect influences perception by placing comparatively large value on the peak and the end of an event. These perceptions influence experience, satisfaction, and decision-making. This paper looks at the potential for firms to exploit this mechanism. There are numerous reasons for thinking that it can, despite the lacking personnel economic research. These reasons are explored in a piecemeal fashion, with an emphasis on combining research of psychology, organizational science, and economics. This exploration suggests theoretical merit. Further preliminary work is then done on the technical matters of ethical concern, measurement of experience, and theoretical frameworks. Finally, an experimental design is given that could be used to provide empirical validation.

Keywords: peak-end effect, peak-end rule, personnel economics, firm strategy, broaden-and build, JD-R model

Redelmeier, Katz and Kahneman (2003) and Redelmeier and Kahneman (1996) studied colonoscopy treatments and corresponding patient preferences. They found that patients preferred i) long and downward-sloping ending treatments that prolonged total pain duration, over ii) short abrupt ending treatments that stopped at higher pain/discomfort levels. What these experiments show is that individual preference is not based on experience during events alone, but also on subsequent perception. This phenomenon has been dubbed the *peak-end effect*. Intuitively, the term indicates that perception of the event after it has taken place is relatively heavily influenced by the peak intensity and the end intensity, not by a uniform aggregate of moments.

This concept is closely linked to that of *duration neglect*. This concept has its origins in experiments such as Kahneman et al. (1993). Participants hold their hand in a) 14°C water for 60 seconds, and b) 14°C water for 60 seconds with the addition of 15°C for 30 seconds. These are supposed to be painfully low temperatures. The participants prefer option (b), despite it providing 30 seconds more pain; participants thus ignore duration. However, as it turns out, this duration neglect disappears with sufficient familiarity of the situation (Morewedge et al., 2009). Moreover, Liersch and McKenzie (2009) argue that the originally discovered duration neglect disappears when the evaluations are represented in graphs instead of lists of numbers. So, seeing how duration neglect does not have the same empirical status as the peak-end effect, this paper will focus exclusively on the latter.

What the peak-end effect and duration neglect have in common is the concept of domination; one option is objectively superior with regards to experience during the event. This can be illustrated by the water experiment; option (b) is dominated, because it is option (a) with the addition of extra pain. And yet, people prefer dominated options. This could be either because i) we give too much weight during decision making to perceptions of past events, or ii) perceptions of past events give us so much utility that it is worth it to lessen the utility of the event itself. No solution is provided in this paper, but the issue will be enlightened enough for the purposes of this paper in section 3a.

Historically, relinquishing the need for maximizing net experienced pleasure of events, as happens with the peak-end rule, is not a new type of phenomenon. Such a notion can for instance be seen in Nozick's argument against an experience machine; a machine that gives great experience even though in the actual world people have no interaction besides being attached to a machine. An equivalent example is Aldous Huxley's novel "a brave new world". It is a dystopia that is ruled by the drug soma; a drug that enhances experience and disregards perception of the past and any form of contemplation. The same treatment is found in Mill's Utilitarianism, in which he argues that is preferable to be a dissatisfied human to a satisfied pig, and to be a dissatisfied Socrates over a satisfied fool (Mill, 1863). Furthermore, there is a widespread tendency to delay pleasure to the afterlife and/or live an abstemious life that does not trivially allow the label of rational maximizer of experience (utility).

The following intuition pump illustrates the difficulty of these historical problems: would you either go on a new vacation, or relive your favorite vacation again by first erasing the memory and then experiencing it once more? The answer is not clear for most people partially due to the descriptive fact that we do not only care about experienced moments, but also about meaning, self-esteem, purpose, and many other factors; think only of how someone could incessantly strive for meaning in life despite the unlikely completion and the difficulty of pursuing it. This contrasts with our normative account of maximizing utility of all experienced moments; something traditional economics asserts we do by rational decision-making. This last assertion is corroborated even more by the finding that the peak-end effect extends to evaluations of the global quality of a life (Diener, Wirtz & Oishi, 2001); people prefer wonderful lives with abrupt endings to wonderful lives with

additional years of mild happiness (James Dean Effect), and a terrible life with additional bad years to a terrible life that ended abruptly (Alexander Solzhenitsyn Effect)¹.

Furthermore, that the peak-end effect is strong and robust is suggested by how the concept has permeated different areas of research. Namely, retrospective evaluations by students of effortful study have the same peak-end results as the painful water experiment described above (Finn, 2010); and experiments of low- and high cognitive load done with primary school students did likewise, even to the point of influencing subsequent behavior (Hoogerheide & Paas, 2012). Moreover, the peak-end effect is equivalently present in music experience evaluations (Schäfer, Zimmermann & Sedlmeier, 2014); in exercise experience evaluations that simultaneously predict future affect (Zenko, Ekkekakis & Ariely, 2016); in material goods experience evaluations (Do, Rupert & Wolford, 2008); and in experience evaluations of casual games (Gutwin et al., 2016). Lastly, there is even preliminary experimental evidence for evolutionary origins of the peak-end effect (Egan Brad et al., 2016). The aim of this paper is to look into whether this list can be extended to firm interests.

Relevancy for firms

If this extension is to take place, certain prerequisite factors need to be present for the peak-end effect to even possibly be relevant to firms. The following are four of such prerequisites that each individually can make the peak-end effect interesting for the firm: i) the employee fails to incorporate the peak-end effect due to (systemic) flawed decision making, ii) there is a collective optimum, but it can not be reached by individuals due to individual versus group rationality differences, and only an overseer such as the firm can arrange the optimal equilibrium, iii) employees are rational, but also have strict time preference and therefore choose not to sacrifice current experience for later perception; the firm has a much less pronounced time preference; the firm can exploit this difference by investing in later employee perception by giving monetary compensation to the employee to obtain the peak-end effect, and iv) employees are risk-averse; if the payoff of investing in experience is risky, because future perception is not guaranteed, then the (comparatively) risk-neutral firm can exploit this difference by incentivizing the employee, or taking on the risk of the employee; the employee then can invest current experience for the payoff of future perception (i.e. remembered experience).

The evidence for (i), without the peak-end effect attachment, is quite robustly established; see for instance Gilovich, Griffin and Kahneman (2002). Also relevant here: the predictions on which decision are based systematically go awry (Gilbert & Wilson, 2007), and optimal choices are often not chosen or identified at all (Hsee & Hastie, 2006). This would be interesting with regards to firm intervention/steering of decision. Point (ii) is quite robust as well. The assumption that individual rationality leads to optimal group outcomes was already challenged decades ago (Olson, 1965). However, one caution here is that modern interpretations exist on this point that claim that individual and group rationality can clash, but not necessarily so (Ostrom, 2015). This fact makes point (ii) slightly more empirical, but still theoretically valid. Time preference of point (iii) is also prevalent in the literature, but the particularities are not too clear due to lacking empirical evidence (Malhotra, Loewenstein & O'donoghue 2002). Finally, the difference in risk aversion between large and small is also standard economics; an example is Pratt (1992). So, overall there is pretty good evidence for these standard economic points. The remaining question is whether they can be specifically extended to the peak-end effect. Not all of these four will be examined directly, but a version of (ii) will be modeled in section 3c; the other three are used here as reasons for potential relevancy, and for background of the theoretical arguments.

Curiously, these four points mentioned above favor the interest of the employee; not directly that of

¹ This is not to be regarded as proof, but as (suggestive) evidence. The reason being that people can say they prefer anything to anything if there are no actual consequences directly linked to the options decided upon.

the firm. However, while they do not directly interest the firm, they could have a crucial indirect effect. It is for instance interesting to note is that perception in fact does influence decision-making (Read & Loewenstein, 1999). This makes it more likely that, when the firm is able to induce the peak-end effect, the firm benefits indirectly. This indirect effect could be in the form of employees' environment conversion (of non-pecuniary benefits) and resourcefulness building. The firm's advantage of these two factors encompass both cost reduction and benefit increase; lower willingness to accept (WTA) wages and rise in productivity are theoretical reasons that could account for these advantages respectively.

Research Questions

To guide the paper in a global direction, the following questions are used:

- (1) *What is the current status of the peak-end effect in personnel economic research?*
- (2) *Is there suggestive evidence for the strategic benefit of incorporating the peak end effect?*
- (3) *What are the issues for scientific evaluation of incorporating the peak-end effect in firms?*

These questions all have their own corresponding numerical section. In section 1 it turns out that the peak-end effect has hardly any presence in personnel economic literature. A case is then made for its importance despite this neglect. Section 2 is an economic tool-bag-style investigation; multiple economic theories and assumptions are used and applied to the peak-end rule. Additionally, insights from positive organizational science and related fields are used as supplementary evidence. The conclusion is typical for a theoretical tool bag approach: there is evidence for the strategic advantage of incorporating the peak-end effect, but empirics are needed to validate and delineate the evidence. This delineation is what section 3 attempts to do. It does so by clearing ethical concerns the firm might have, by discussing measurement, and by providing a framework for modeling.

1: Peak-End Effect Research

For this paper, multiple database searches, such as Google Scholar, EBSCOhost, and the EUR library consisting of 54 databases, hardly gave any satisfactory results for the following combinations of terms:

personnel economics, peak-end effect, peak-end rule, perception, duration neglect, personnel, economics

Even minor adjustments did not provide anything more substantial². Moreover, in Lazear's *Personnel Economics in Practice* (2009), which is supposed to give an overview of the current state of the field, there is no direct mention or utilization of the peak-end rule³. The closest matching result I was able to find is in Clark and Georgellis (2004). Herein they find empirical evidence from German and Great Britain employees that suggest that the peak-end rule, as measured by for instance job satisfaction, can predict job turnover rates. They similarly conclude that they are unaware of likewise application of the peak-end rule in labor economics.

That said, there is something in Lazear (1979) that resembles the peak-end rule. It is the idea that in the beginning of their firm career workers get paid less than their marginal product, and that at the end of their firm career they get paid more than their marginal product. This practice incentivizes

2 I remain open to the possibility that I have missed papers due to search engine difficulties and/or different terminological use of relevant papers. Most implications and conclusions in this paper do not suffer from such a find though.

3 See appendix A.1 for the topic list that is covered by Lazear.

workers to stay at the firm and to keep them motivated. Similarly, the theory of efficiency wages in combination with desensitization to incentive stimuli provide support for the notion that the peak should always be at the end for positive experiences. However, these theories differ slightly from the peak-end rule. Namely, the peak-end rule is primarily about perception, whereas a need for increasing incentives is neutral between experience and perception. This neutrality, in addition to personnel economic's neglect of the peak-end effect, indicates that the field does not distinguish between perception (i.e. memory of event) and experience (during events).

This absence could be explained by the following options:

- (a) the peak-end effect is not a priority topic, and the nascent field only focuses on these
- (b) the peak-end rule's establishment has not been long enough for research to catch up
- (c) personnel economics has not branched out far enough, despite its ability to do so

Whereas (b) is relatively neutral, and un-controversially true to some extent, (a) and (c) are more akin to diametric opposites. In this paper I will assume the validity of (c). This assumption is crucial for the relevancy of this paper, because firstly, the theoretical arguments in section rely on the use of many posits already available but from outside of the domain of current personnel economic, and secondly, because there would otherwise be no real purpose in doing an experiment on the peak-end effect before any of the more pressing matters in personnel economics are dealt with. Simply put, research resources are limited. Therefore, I will shortly defend assumption (c) now.

As can be seen from an overview such as Bandiera, Barankay and Rasul (2011), experimental personnel economics targets primarily versions of established practices; this in the form of, among others: rental rates of automobiles, effect of social connection on behavior and productivity, interactions between incentives and social connections/monitoring/peer groups, non-pecuniary benefits such as 'employee of the month' type rewards, employee ranking systems, capital constraints, and managerial input.

These almost all examine a set, connected by family resemblance, of already established practices. The normative aspect then comes from deciding which option in the set is best between these contemporary practices. What it does not do – and this is the crucial distinction – is give a normative account of the best practice of the set of *all* possibilities⁴. I would argue that the peak-end effect is in this full and unexplored set. This does not entail that (a) cannot be the case; it might very well be true. However, it does indicate that personnel economics currently restricts itself to either, theoretically dominant work on firm behavior (Gunderson, 2002), or, empirically dominant work focusing on the theoretically or practically prevalent kind just discussed. The tacit execution of such a method then leaves the door open for (c) to be true. Do note that these claims are quite mild in general, as fields should necessarily constrain their scope. The argument is only that some areas in contemporary personnel economics are too constrained, and that perhaps therefore, as a result, the peak-end effect is neglected.

This last point can be extended further. Namely, besides researching mainly established practices, personnel economics also restricts itself, at least to a certain extent, to economic theories only. A point in case comes from Bandiera, Barankay and Rasul (2011):

4 I claim this for most topics that are discussed in experimental personnel economics. Arguments could be made that for instance with job application the field is open for completely new normative ways of hiring without bias, but definitely not all are discussed that way. Illustratively for my overall point, (Bandiera, Barankay & Rasul, 2011) and List (2011) argue for firmly grounding experimental economics in economic theory. This very recommendation might hold back those hypotheses that have little theoretical economic ground yet to stand on, even when they do get positive empirical results.

“Delegation of authority and decision making is an essential ingredient for firm decision making is an essential ingredient for firm expansion, and yet we have a very limited empirical understanding of why some owners fail to delegate”.

They make this claim despite leadership being a widely researched topic in organizational science (Avolio, Walumbwa & Weber, 2009). Moreover, a two-decade meta-review from 1999 on leadership styles already established the comparative effectiveness of transformational leadership (Bass, 1999). These leadership styles are still widely in use in psychologically inclined fields; not in economics.

The advantage of psychological research is that, in general, the evidence has more expressive power than that of economics. Therefore, psychological research can prove much more⁵. Despite economists' (perhaps justified) widespread dismissal of the evidence base of such theories in psychology, this does not entail that they should also dismiss the message of these theories; they could perfectly well function as guides and inspiration for economic research. This might also not be far from what is admitted by papers such as (Bandiera, Barankay & Rasul, 2011). It is just that the field does not do so to the fullest, which is perhaps an uncontroversial statement.

So, what I am of course not claiming is that economists do not use psychology. See only Sent (2004) for the resurgence of psychology in economics in the form of behavioral economics. Instead, I am claiming that psychological insights are not used to a sufficient degree. Sufficient use is what could be illustrated by the following structure, one that contains psychological insights aiding in the plausibility of the peak-end effect for firm strategy:

- *Psychology research that shows what the peak-end effect could do for employees:* JD-R model + Broaden-and Build model
- *Corresponding ways this could economically be modeled into firm benefit:* increased performance + environment conversion (non-pecuniary benefits) leading to wage decrease (WTA)

Without the psychological theories, the plausibility of firm's benefiting from the peak-end effect would severely diminish. This is so because, firstly, there is little economic theory to my knowledge of the conversion of experience to performance, and secondly, there is little empirical evidence to back up the hypothesis that the peak-end effect benefits the firm. Research in psychology is therefore currently crucial to the hypothesis that firms can benefit from the peak-end effect.

Lastly, now that a validation for the paper is given, it might be important to mention that there are already be practices in general business that mimic the effect. Drinking after work in the service industry is for instance a phenomenon that could be characterized as such. Similarly, there is the more pronounced version ubiquitously practiced in Japan; they even have an actual term for drinking after work: *nomication*; a mix between *nomi* (drinking in Japanese), and communication (Yamauchi & Orr 2011). Moreover, the presence of the peak-end effect is also prevalent in business parties, events, business communication, and many other activities that employees take into their own hands. The crux here is that current usage of the peak-end effect is informal and left mostly to the employee's own invention and behavior. The only formal implementations I can think of are communication instructions that resemble the kind of 'end on a positive note'. Furthermore, these informal examples of peak-end effects have confounding causal variables such as the need for socializing and cultural pressure, and thereby making their use and analysis either difficult or superfluous with regards to systematizing the peak-end effect in firms.

⁵ I will treat this as a universally acknowledged fact. But to give one example: economists' generally dismiss lab experiments that are not properly incentivized, whereas psychologists are not as strict about it.

Looking forward, since there does not seem to be a clear systematic practice and research of the peak-end rule, the main purpose of the remainder of this paper is to find out if a normative theory for the peak-end rule can nevertheless be provided that can subsequently be exploited by firms. This will be done firstly in section 2 by showing theoretical arguments for why this could be case. Following this, section 3 will technically delineate the problem and provide a framework for empirical testing.

2: Theoretical Reasoning- and- Implementation

This section has three parts. The first looks at theoretical reasons for the peak-end rule, the second at theoretical reason against the peak-end rule, and the third at how the peak-end rule could be implemented in the firm. Short theoretical arguments are given in piecemeal fashion for all arguments. Additionally, behind every reason there is a marking in brackets on whether I think they are important to the overall argument, less important, or speculative. The less important and speculative reasons are for completeness sake. No global implications will be drawn since there are no comparative empirics that allow such inference, but speculative suggestion could possibly argue for a positive result.

(I) Theoretical Reasons for Incorporation

Perception influences Decisions (Important)

This is repeated throughout the paper and perhaps seems trivial, but it is important to state nonetheless: remembered utility (perception) changes decision utility (Read & Loewenstein 1999). Its importance comes from the strategic purposes it can have. Simply put, theoretically, the peak-end effect leads to different perceptions that lead to altered decision-making, which is potentially beneficial to the firm. This principle is applied ubiquitously to all theoretical reasoning.

Environment Conversion (Important)

Employees are sensitive to environmental factors. This should come as no surprise, as even standard micro-economics asserts the point. Essentially, workers prefer good environments and need to be compensated for bad ones. This is why dirty mining and logging jobs can pay so well, despite it being manual work that requires little educational investment. Similarly, employees prefer to work in small businesses even though large businesses pay more and have better facilities; for more on this, see Storey (2016). Apparently, the social environment matters enough to compensate for these perks offered by large businesses. This does not entail that facilities do not matter for employees; namely, new work environments also have higher employee satisfaction (Appel-Meulenbroek et.al. 2015)⁶. Any firm paying attention to this principle would consider enhancing the environment, as it could lead to employee acceptance of lower wages.

JD-R model: Personal and Job Resources (Important)

In organizational science a main tenet is the importance of personal resources and job resources. Even though there are different models and theories in the field, the overarching idea is that these resources are important for productivity. The increased productivity can be mediated by prevented burnout and increased work engagement (Bakker & Demerouti 2007). For illustrative purposes, I will use the Job Demands Resource model (JD-R model) of Bakker. In this model, perception of meaning and general satisfaction (perception of experiences), play a role in building these personal resources. So, to exemplify, this models states for instance that, by providing facilities to obtain a peak-end effect, the firm creates job resources that increase personal resources, stimulate engagement, and deter burnout. This will then eventually translate into increased productivity.

⁶ Arguably even without selection effect.

Broaden-and Build Theory (Important)

The broaden-and build theory is similar in kind to the JD-R model. It consists of a broaden hypothesis and a build hypothesis. *The broaden hypothesis* states that positive emotion, comparatively to neutral and negative emotions, have broadened scope for all of the following: thought, action urges, precepts that come to mind, social awareness, semantic perception, visual perception, and physical demeanor. Complementary, the *build hypothesis* states that people who experience positive emotions with higher frequency are more resilient, more resourceful, better socially connected, function at higher/more optimal levels, and so on (Fredrickson, 2013). These hypotheses combined give compelling evidence that positive emotions themselves have an important role to play. Moreover, there is also evidence that the mechanisms of broaden-and build have actual affect on the behavior and thoughts of employees in the workplace (Vacharkulksemsuk & Fredrickson, 2013). Similar in importance, happiness does not only correlate with career success, it also longitudinally precedes it (Boehm & Lyubomirsky, 2008)

The incorporation of the peak-end effect for employees could increase positive emotions for employees if done well. This could be from increased satisfaction, and/or a reduction in negative emotions such as stress. The reduction of the latter, for instance, gives the opportunity to feel positive emotions and thereby broaden and build. Whatever the actual mechanisms are, the importance of increasing positive emotions in employees for strategic firm purposes is evident if the broaden-and build theory applies.

Social Optimum (Speculative) + (Important)

It could be possible that there is a global optimum that cannot be achieved by local individuals; this is equivalent to how the government steps in due to necessary large investments and subsequent free rider problems. For instance, suppose that the peak-end effect could be obtained, but it could only be done if a big investment was made into facilities such as lounge rooms for after work leisure. Individuals could then not have the funds to arrange such a thing, and even if they had, the free-rider problem would remain.

The failure to reach an optimum is perhaps less speculative, which I base on the JD-R model and the broaden-and build model, in the following form: current firm policy of making employees work hard all day is suboptimal, and instead, an optimum would be to give employees to take it easy at the last part of the day to obtain a peak-end effect. This will be modeled in section 3c.

Impatience (Speculative)

The general principle of the peak-end rule is swapping current experience for perception. Contrary to this principle, people have a tendency to prefer their experiencing self to their future self. This is elucidated by the tradition of time preference in economics theories (Malhotra, Loewenstein & O'donoghue, 2002). However, this is despite the fact that the same article concludes that empirical evidence does not favor it and/or is hard to find. Nevertheless, if employees are in fact systematically too impatient for their own good, then they might benefit from a little nudge. Another way to put it is: if employees very heavily favor the present, then firms can strategically exploit this by giving a little monetary incentive now in order for the employee to get a peak end effect. Later, the employee will accept less money/bonus on the assumption that perception of job (satisfaction) is calculated into utility/monetary compensation. Such a method exploits the difference in impatience between a firm and the employee. But, since this method is not the only way to exploit the difference, it might be more beneficially applied elsewhere.

Synergistic effects (Speculative)

Plain synergy can come from external spillover effects. This is exemplary in basic education; education does not merely benefit the individual, it also benefits the society by the added value in the form of good behavior, political choice, work performance, etc. Furthermore, there might be

synergistic thresholds, such as those found in complexity theory, which are related to the influence of the peak-end effect. Crossing such a threshold would greatly increase the effect. This potential threshold could be for instance when the employees with positive emotions or proper resources is above a certain percentage; this threshold is thus needed for teamwork to be strategically optimal, whereas working in isolation was before breaching the threshold.

Brand value (Speculative)

The image of the company could rise due to employees being treated well. This could convert to brand value.

(II) Theoretical Reasons Against Incorporation

Inhibiting Overtime (Important)

If the firm incentivizes stopping work to get a peak-end effect, then it simultaneously disincentivizes working overtime. For the firm, overtime might be an important profit mechanism. That said, regulations on overtime are becoming more common, at least in the EU (Freyssinet & Michon, 2003); and as expected, the regulations reduce forced (and total) overtime hours (Oaxaca 2014). So, as overtime is becoming less important for firms, the potential inhibiting effect is weakened. Nevertheless, if it turns out that stimulating the peak-end effect permanently reduces overtime hours, this issue could be detrimental for companies that benefit greatly from its presence. Interestingly to note, the possibility remains open for the peak-end effect to kindle further engagement and increase voluntary overwork hours. Admittedly though, this is momentarily more in the realm of pure empirical speculation than that of a constructive hypothesis.

Uncertainty and Risk (Important)

Currently there is hardly any empirical evidence available on the peak-end effect that is precisely tailored to firms. Theory is therefore all that firms can rely in with regards to the peak-end effect. The inherent uncertainty of such an endeavor is most pressing. Indicative of this is the local application of the theory and the subsequent global implication of the enactment; untested theories are naturally blind to global implications due to the act of prediction being intrinsically complex. I recognize that the potential epistemological issues extend to at least a) group versus individual differences, b) unforeseen implications, c) economy downturn during investment, d) lack of peak-end robustness, e) lack of peak-end effect size.

Potentially Ineffective and Costly (Important)

This worry is more of an amalgam of the rest. Namely, if the peak-end effect has little benefit, or if it has too high of a cost for the firm, then there is no chance of implementation. Eventually, empirics will need to give the outcome of this. That does not mean the firm cannot make an active decision on the peak-end effect however. The firm can for instance, with the addition of some intellectual estimations and calculation, use the theoretical arguments and tools provided in this paper to predict the outcome.

Paternalism (Less Important)

If the employees get the impression that the firm is trying to micro-manage them, then that might cause them to feel paternalized. Such an outcome is preferably avoided, as *locus of control* and *freedom* are important factors for employee satisfaction and performance (Judge & Bono, 2001). Even those that argue for paternalism as managerial strategy do so under conditions and limitations (Padavic & Ernest, 1994). Therefore, due to the fact that a forced peak-end effect is less likely to work effectively, something like an incentivized or facilitated option should have priority. Fortunately, non-paternal practices are already commonplace. Exemplar is the offering of multiple contracts which rewards truth telling of the employee with respect to whether the worker is hard

working or not. The relevant essences of these practices could be used similarly to avoid paternalism. Therefore, the danger of paternalism seems circumventable.

Increasing Inequality (Less Important)

Inequality could be increased if some accept the peak-end effect while others do not. To illustrate, suppose the peak-end effect is incentivized. Then the acceptance of this incentive by some results in net inclusive wage differential inside the firm. This is an unwanted effect if employees care about relative wages. The fact that employees care about such matters is commonly assumed in behavioral economics; arguments for these assumptions can for instance be found in Frank (2001). If this issue of inequality turns out to be particularly pressing, it might be wise to facilitate the peak-end effect, such as with relaxation rooms, rather than by means of monetary incentive.

(III) Potential Implementation

Incentives

Incentives are the economists' favorite tool, and for good reason; they work. They can come in a variety of ways, and often it is simply a matter of choosing the correct height and combination of incentives. Even though this is straightforward, the actual implementation is not. Take contract theory as an example. The general methodology is here is contract design with the help of stylized facts, while simultaneously remaining conscious of the low empirical evidence; the latter is for instance shown in Chiappori and Salanié (2002). To illustrate the difficulty of the topic, it could for example be that people are heterogeneous with respect to risk, incentives, and more. Allowance for complex heterogeneity is standard practice in organizational science, but due to the general economist's desire to build highly tractable models, they adopt different styles of doing science. Whatever the merits are of this approach are, the fact remains that incentives can come in multiple forms, and that we do not exactly know which work best. Any suggestions will thus be just that; suggestions.

Here are a couple of options available:

- direct salary increase: reward the employee for participating in the peak-end effect
- bonus increase: reward the employee with a bonus at the end of the year if she participated in enough peak-end moments
- give reward tokens: similar to how trophies work; give the employee something tangible
- hierarchical improvement: let participating in the peak-end effect increase social status and increase future promotion chances

One problem with all these approaches is that directly incentivizing the employee to participate might crowd out intrinsic motivation (Bénabou & Tirole, 2006). The more mundane problem is how high the incentives should be. These effects are ultimately empirical matters, but could nevertheless be theoretically estimated in a manner likewise to contract theory or other incentive forms currently in use in economics.

Shorter Work Hours

Social benefits are related to shorter work hours. Namely, there are policy arguments for shorter workweeks to enhance income inequality and unemployment (McCarthy & McGaughey, 1989), and arguments for environmental benefits of shorter workweeks (Rosnick & Weisbrot, 2007). Despite the controversial nature of these arguments, and the fact that social ends are not direct firm issues, accounting for these social concerns is still worthwhile; if only because it translates into brand image and an improved view of the firm in the eyes of the employees.

More directly related to firm interests is topical empirical research, such as one that found that

nurses that worked overtime had significantly increased risk of making errors (Rogers et al, 2004). Moreover, medical interns had significantly more sleep and less attention errors when extended works shifts were eliminated (Lockley et al., 2004). Also, in law firms, lawyers work inefficiently long hours due to the incentive-prone practice of income sharing that law firms currently exercise (Lander, Rebitzer & Taylor, 1996). If such outcomes are preventable in principle, restricting options in the form of work hours might be a consideration. A variation on this could also work: allowing workers to slack the last bit of the day and work less hard than normal. This option is modeled in section 3c.

Facilitation

The firm could provide facilities that the employees could use in order to obtain the peak-end effect. There are multiple facility-candidates available that could take on this role. For instance, there is suggestive empirical evidence that mindfulness at work leads to increased well-being and work-engagement; (Malinowski & Lim, 2015) is one example of this evidence. Moreover, there is evidence that suggests mindfulness can be properly trained to good affect (Keng, Smoski & Robins, 2011). Similarly, there is a whole literature on the benefits and implementation of exercise in the workplace (Kerr, Cox & Griffiths, 1996). Also, social events could be arranged after work hours to promote socialization, which induces not only an end effect, but perhaps also a peak effect; similar in kind to the beneficial extracurricular activities it can promote (Leavitt et al., 2017).

Furthermore, simple facilitation allows employees to reveal preference for incorporating a peak-end rule without any form of reinforcement; obligatory, monetary/social incentive, or otherwise. Moreover, there is also a distinct synergistic effect with firm facilitation. It is firstly, that costs of time and travel go down when the facilities are directly at the workplace, and secondly, that the benefit goes up because the facilities can be used directly after work when stress reduction is most wanted.

Nudge

Nudge is relatively new behavioral economic concept created by Thaler and Sunstein (2008). The main premise is that people operate on simple heuristics and biases that can have problematic outcomes if it were not for simple nudging. The theory encompasses framing effects, default options, and many more systemic cognitive biases. For a more complete list of these biases, see Gilovich, Griffin & Kahneman (2002). A basic premise of nudge is that people make systemically suboptimal decisions. In economic terms: people's total instant utility (anticipated, experienced, remembered) is lower than it could have been due to erroneous estimation of decision utility or a lack of present will power; we simply frequently do not choose and/or see the maximum utility option (Hsee & Hastie, 2006). This critique holds even when we assume we are *satisficers* instead of *maximizers* of utility; a distinction introduced by Simon (1956). *Satisficers* acknowledge constrained ability and time, and therefore make due with an option that is good enough for general purposes. This however does not mask their blindness and systematically erroneous heuristics that could be improved with little effort, or with only a slight change in circumstance. Nudge thus improves on these *satisficers* by nudging them in beneficial directions where they would not have gone on their own.

A classic nudge example is the default option for retirement saving. People often do not have the capabilities or knowledge to get into saving options. Therefore, even a simple default retirement option increases participation (Benartzi & Thaler, 2007). Similarly, it has been shown that having less retirement plans options, only a handful, correlates with higher retirement participation rates than having ten or more (Sethi-lyengar et al, 2004). People simply defer or postpone their choice when they feel anxious and uncertain.

These principles could be used in the workplace by structuring the environment in such a way that

the employee makes decisions that are favorable to the firm. Firms could for instance attempt a default option for after work peak-end activities that only allow skipping when employees have opted out via very simple procedures void of punitive pressure. Equally valid is for firms to exploit certain framing biases by stating or displaying how normal it is to take care of oneself by means of the peak-end effect.

Boost

In contrast to nudging, boosting is more focused on enriching the environment and skills in order for a wider array of opportunities to arise; both have different advantages and disadvantages (Grüne-Yanoff & Hertwig, 2016). Boosting is related to the earlier discussed facility enrichment and JD-R model. However, more mundanely, it is also related to teaching. Essentially, with boost, the firm could opt to provide information to employees on how beneficial a peak-end effect is, and in what way you can achieve it.

Implementation Example

These tools for implementation do not have to be used separately; they could perfectly well synchronize. For instance, techniques from nudge and boost could be used in every single implementation to aid the strength of the effect. Contrarily (ultimately an empirical matter) incentives, shorter work hours, and facilitation might not be so synergistic.

Suppose we choose facilitation as full-fledged example. The firm could then either survey what kind of facilitation would be appreciated by the employees, or predict on current research what kind would be fruitful. Now suppose that the firm found out that its employees have no aversion to mindfulness classes, and that the firm is convinced of the scholarly evidence of the benefit of mindfulness training. The firm could then start advertising and informing with posters, mails, and discussion. This is the use of boost. The firm could also automatically enroll employees and put the classroom in a psychologically favorable place and surrounding. This is the use of nudge. At the mindfulness class the employees can immediately release stress after work, learn useful attention control skills, and obtain a peak-end effect; employees thereby go home with more positive emotion, which favorably influences life at home and personal resources. This all finally leads to firm benefit in the form of satisfied employees willing to work for relatively lower wages at a company that takes care of them, and in the form of increased productivity via more engagement and less burnout.

This example is of course barring that first all factors need to scientifically be controlled for if there is desire to measure the effects of all facets individually. Rather, the example is what a full implementation would look like.

Conclusion Section 2

To reiterate, there are both reasons for and against incorporating the peak-end effect in firms; these are theoretical in nature, and are ultimately judged on a cost-benefit analysis or empirics. Furthermore, multiple option for implementation are available that also need to be weighed on their idiosyncratic interaction for different firms. Note that the material argued here is in no way exhaustive in depth as well as width. However, even though the theoretical arguments in this section are inconclusive, there is considerable reason for firms to evaluate whether they could strategically benefit from the peak-end effect.

3: Technical Delineation

This section uses the theoretical background from the first two sections. Section 1 showed that current peak-end effect research is lacking in economics, and argued that there is evidence from

organizational science and psychology that suggests it should not have to be so. In turn, section 2 displayed a bit closer what this evidence is and what kinds of implementation are possible. Overall section 2's conclusion was that further evidence is needed. This is what section 3 attempts to give a framework for. It does so by first, in 3a, giving terminological clarity and subsequently clearing ethical concerns; this will be necessary for firms to be willing to participate in any experiments. Then, in 3b, the issues of measurement are discussed; these lessons are later used in the experimental design. Finally, in 3c, a theoretical framework is laid out that delineates i) employee types difference, ii) event categorization, and iii) an experiment based on event categorization.

3a: Terminological Theory and.. Ethics

Prior to building a theoretical framework is terminological clarity; and as will be shown here, this terminological analysis has important ethical implications. A key term for the peak-end effect is utility; the technical term for units of well-being and/or pleasure- and pain balance. The concept can be defined and categorically divided in multiple ways. Important terms in the literature on utility treated here are: total utility, anticipated utility, experienced utility, remembered utility, and decision utility. The best illustrative way to understand the difference is the following:

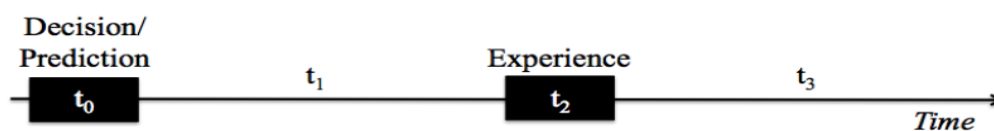


Figure 1.

Source: (Morewedge, 2014)

- *Total (instant) utility* comprises all (weighted) moments of instant (experienced) utility In the picture it incorporates all experiences at t ; $t=0$, $t=1$, $t=2$, and $t=3$.
- *Decision utility* comprises the utility gained during the time of decision. In the picture: $t=0$
- *Anticipated utility* comprises all the utility gained prior to the event by “pre-feeling” or theorizing about the event. In the picture: the experience of $t=1$
- *Experienced utility* comprises all the utility gained during the event. In the picture: the experience at $t=2$
- *Remembered utility*⁷ comprises all the utility gained from remembering the event. In the picture: the experience of $t=3$

Out of these, *decision utility* is the only concept used by traditional economics. The main reasons are two-fold in domain. The theoretical reason i) that people are rational and informed; at decision time ($t=1$) people calculate all the utility gained at all t 's; they also do so for future decisions; by doing so people maximize their decision utility. And the epistemological reason is ii) that measuring experience with something like a hedonimeter as found in Edgeworth (1881) never appeared feasible; instead, revealed preferences are used by decision utility, which is comparatively much easier to measure; there is no need to go inside of the mind; observation of behavior is

⁷ I disagree with this term: I prefer perception. See appendix A.2 for the argument.

sufficient.

However, the issue with calculated *decision utility* is that it empirically differs from *total utility*. This is the same message as in section 2 with nudging. The main idea is that humans are fallible decision makers⁸. The importance of this empirical distinction is so great that it can lead to *total instant utility* normatively trumping *decision utility* as a prescription for utility maximization. The only needed ingredients to do so are a) an empirical distinction between the two, b) an argument that *total instant utility* does not suffer systemic biases like *decision utility* does, and c) a proper measurement for *total instant utility*. Ingredient (a) is quite safe, as seen before with nudge; and likewise arguments could be made for (b)⁹. The crux is perhaps (c), the measurement. Kahneman response it that it is feasibly possible; it is just a technical problem that is currently being improved upon (Kahneman, Wakker & Sarin, 1997).

But alas, even if such a normative victory for *total instant utility* were to be obtained, then that still does not rid us of all problems. Take for instance Kahneman's paraphrased interpretation of remembered utility: people make decisions mostly based on what they remember, and memory is highly influenced by the peak-end rule. This is what is called a descriptive account of remembered utility and decision. But, importantly, from this we cannot infer a normative account. To illustrate what I am trying to argue, take the following quote from Kahneman, Wakker and Sarin (1997):

“...normal subjects also choose to expose themselves to avoidable pain because of the peculiarities of remembered utility. Do preferences that exhibit almost total duration neglect deserve respect?”

This question seems almost to rhetorically steer toward 'no'. Nevertheless, my simple answer is yes; yes they should. The oddity for Kahneman is that experienced utility (at $t=2$) is not so relevant for decision making, whereas remembered utility is massively so. This purportedly entails that people are not rational. However, this implication can simply not be drawn. It could be perfectly rational for me to endure two minutes of added pain, because I know that my memory functions in such a way that doing so will give me the highest *total instant utility*. Therefore, there is simply no way to prove by Kahneman's observation alone that this decision sequence is irrational. So, with this in mind, no full normative account of *total utility* can be given unless this issue is solved.

Unfortunately, this is not an epistemological issue that fades with time; it is here to stay. The reason is traditionally simple: we lack a hedonimeter. *Total instant utility* is a normative term which makes finding a proper descriptive correlate so difficult; think only of the issues neuroscience faces (more in section 3b). Furthermore, the normative nature of the term ensures its empirical *and* theoretical defeasibility: Kahneman can argue that we should trust the experiencing self, I can argue that we should trust our remembering self, someone else can argue that we gain utility from finding meaning and not from experiencing pleasure and pain. If no proper brain proxy data can dampen the appeal of any of these options, then they can all be assumed without the opportunity for falsification or invalidation. Subsequently, the options can only be argued from outside the empirics of the domain in question. Due to any proper proxy/correlate seeming distant or impossible, the current problem is not too far from the primary one in ethics: normative theories face difficulty gaining universal agreement due to the limited evidence base that is available. This is the reason for why much in contemporary ethics has its origin in intuitions and collections of opinions¹⁰. It is not that

8 The other idea is that people have time-preferences for present time when making decision, and therefore do not maximize total utility. Time preferences could still be rational; fallible decision-making cannot.

9 I will not treat this directly, but will give some general comments: *total instant utility* cannot be systemically biased because it is a normative concept that is insensitive to (most) empirics; the issues it can face are thus more of the theoretical-virtue kind.

10 This is not a controversial statement. For instance, see the result of the survey of philosophers on moral realism: “Accept or lean toward: moral realism 525 / 931 (56.4%)” (Bourget & Chalmers, 2014). And those that do accept moral realism are often of the deontological kind (29.1% of total). These are based on argument rather than evidence

no satisfactory normative theory can arise from the evidence. Think only of an ethical theory that prescribes action based on statistical account of insufficiently alterable evolutionary-ingrained thoughts. It is just that such a theory has a lot of work to do to become (defeasibly) accepted.

This conclusion is important for this paper with regards to the implications it has for the peak-end effect. To stress again, people could be rational decision makers while simultaneously giving higher weight to the peak and the end of an event, rather than a uniform addition of all moments of the event's *experienced utility* ($t=2$). The fact that people are not rational decision makers due to fallible decision-making does not entail anything for the normative state of the peak-end effect. So, to summarize more fully: there are empirical differences between *decision utility* and *total instant utility*; people make fallible decisions; therefore we might want to adopt *total instant utility* as the prescriptive norm; decision are heavily influenced by the peak-end effect; this leads to a seeming tendency to normatively correct for the peak-end effect; however, this corrective tendency has no ground; the peak-end effect is thus normatively neutral; albeit defeasibly so.

The importance of this neutrality becomes important in the ethical domain of incorporating the peak-end rule in firms. The primary reasons for firms to make use of the peak-end rule is that it steers the employees' memory in such a way that gives favorable decision-making and increased performance. Anthropomorphically put: the firm does not want to maximize employees' *total instant utility*; it wants to maximize profits/shareholder value. The ethical peril would come from the assumption that this firm goal could only be achieved by systematically exploiting the faults of employees and thereby lowering their *total instant utility*; something not be taken too well by the general public. Thus, the refutation of this negatively loaded assumption is crucial.

Conclusion 3a

The peak-end effect primarily plays on i) the perceptions of the experienced utility, and ii) the utility gained from how the event is remembered. These perceptions of (i) are highly important for decision-making. Also, firm exploitation of the peak-end rule can perfectly well coincide with mutual benefit or with a Pareto improvement.

3b: Measurement

Instant utility is measured primarily by self-reports with bi-polar scales of valence. An example is scales of feelings ranging from extremely happy to extremely unhappy. Furthermore, observational and physiological measures are used as supplementation when we know there are systematic biases in reporting; such as enjoying the pain of others (Hoogland et al., 2015). Evidently, models of total utility do exist (Baucells & Bellezza 2016). However, they are currently simply (too) difficult to tractably execute.

The difficulty lies with measurement. Even if it is possible to measure perception with satisfaction scales, that still leaves measuring experience. Sure enough, there are measures that objectively proxy for experience such as heart rate monitors and devices measuring sweat response. However, the problems with these options is, firstly, that they are invasive, which can both positively (placebo) and negatively (stress, distraction, etc.) influence the outcome, and secondly, that they insufficiently proxy. Moreover, and quite telling, even neurobiology or neuro-economics cannot capture direct experience yet; on the assumption that such a thing is even theoretically possible. In any case, current solutions will not be feasible for a workplace; an attached brain scanner that is able to remain noninvasive seems unlikely. So, because objective proxies seem difficult to introduce, and evaluation by others of one's experience is also unappealing in general, self-

base. Very little then remain that believe we can discover ethical rules by empirically searching for them in a direct manner; only via a roundabout of semi-proxies and assumptions.

evaluation look like the only sensible option left.

Evidently, self-evaluation has multiple issues too. First, it uses perception (of experience) as a proxy for experience. This is similarly seen with the origins of the peak-end effect, in which participants would rate (perceive) what their experience was. Second, contextual factors influence perceptions in self-evaluation (Schwarz & Strack, 1999). Third, asking employees how they are feeling frequently during the day is bound to foster omitted-variable bias. There are less invasive ways however. Kahneman (et al., 2004) for instance developed a survey for measuring daily experience that is supposed to deal with these issues. Furthermore, there are potential future implementations of habitual- and- noninvasive registration of experience level via devices that can receive signals during the day. An indicative example of this is the attempt to use mobile phone devices to automatically measure stress levels during the day (Muaremi, Arnrich & Tröster, 2013). However, these are still far away from being trustworthy tools. Therefore, in general with respect to all such methods, apprehension and purported solutions need to be normatively assessed per case, preferably based on theoretical virtues such as found in (Keas, 2017).

However, even when these issues are solved for, there is a more devastating critique looming; one I have not yet come across in the literature. This critique is about the theoretical impossibility of instant-utility measurement; at best, it can only be predicted. The reason is simple: t_3 is not a random moment in the future, but is all the future moments in which utility is derived from that particular event. Therefore, every measure at a specific time in t_3 needs to predict further future gains as well. If this necessity to predict seems familiar, it is because it is exactly the same principle as in decision utility: (rational) people incorporate predictions into their decision evaluation. *Total instant utility* thus also suffers (partially) from the same critique decision utility receives, namely: simulating future events and their hedonic content is highly fallible in humans (Gilbert & Wilson, 2007).

Conclusion 3b

Since measurement is so problematic, it might be wise to a) abandon direct measurement for current personnel economic purposes, and/or to b) use measurement of experience only as a control for theoretical results. This conclusion is a bit too hasty however. As Clark and Georgellis (2004) who are mentioned in section 1 show: a proxy for the peak-end effect (satisfaction) does in fact have predictive power. Standard empirics of experience are thus not to be dismissed, despite the fact that there are severe theoretical issues.

3c: Theoretical Framework

In this part of section 3, a couple of theoretical frames, consisting of employee types and event categorization, will be laid out. Afterwards, the event-categorization equations will be used in an experimental design. This will not be done for employee types, even though there is a possibility to do with a different design. Employee types are primarily discussed here to show the difficulty in designing experiments based on possible individual heterogeneities.

Employee Types

Since employee characteristics influence the effects of firm policies, it is interesting to look at different types and how they affect outcomes. Two types are discussed below.

Employee (I): requires firm facilitation

No direct incentive needed, facilitation of options suffices. Employee type (I) does not bear the risk of getting crowded out intrinsic motivation, and is most free with respect to choice. Employee (I) also thrives on synergistic social effects, and benefits if more than P employees participate in the

peak-end effect.

With this characterization in mind, suppose that the workforce consists of employees (I). Then it is possible that the peak-end effect will not be obtained, similar to the social optimum discussed in section 2. The following employee conditions and assumptions illustrate a bad condition (B), and a good condition (G):

Condition (B): no overseer facilitates the option for obtaining a peak-end effect

- *A (1):* employees gain net utility if more than P stays to get a peak end effect, but become impatient and dissatisfied when more than (1-P) do not stay
- *A (2a):* for every single employee, the cost of arranging P or more employees to stay is too high to in comparison to the utility gain from the peak-end effect
- *A (2b):* for every single employee, the cost of working in teams to arrange that P or more employees stay is too high in comparison to the utility gain from the peak-end effect
- *Conclusion:* for each employee, it is best to put in no effort and thus not obtain a peak-end effect.

Condition (G): an overseer facilitates the option for obtaining a peak-end effect

With the same assumption as before we get the conclusion that everyone participates in the peak-end effect and that there is maximum synergistic effect. The only remaining question here is the state of the cost-benefit analysis of the firm.

Employee (II): requires incentive

Employee type (II) needs direct incentive in order to prefer choosing a peak-end effect. Assume only the following:

- *A (1):* Equality and justice is so important that employees get the same incentives
- *A (2):* Preferences among employees (II) are heterogeneous with regard to WTA (willingness to accept)

The height of the incentive is then at the point where no marginal added value can be obtained by going higher or lower; as is the case in standard micro-economic theory. This can be influenced by: potential synergistic effects, crowding out of motivations, and benefit of the peak-end effect.

Employees might be more like (I) in one firm, and more like (II) in the other. Naturally, there can also be other dominant types in various sectors. What the dominant type is in a firm will help determine what kind of peak-end policy the firm should implement. Further empirics should also aid in matching firm policies to employee types.

Event Categorization

It might seem trivial, as the literature does not explicitly discuss it, but events are not ordered a priori into neat packages. What counts as single events relies upon people's experiences, perceptions, and social forces influencing those two. This is a matter that would need to be established empirically for every type of event; unless we can assume that we have universally correct first instincts about almost all cases, which is a hypothesis that carries the burden of proof.

To illustrate the event category difficulties, take the workday of the employee as an example. Now, what is it exactly that the employee is taking the peak-end effect from? A standard explanation might be: ‘from the topic that is being evaluated; the day’. The reasoning then is that this pre-structured event-unit has actual carryover to everyday life where no such evaluations of units are asked. A point in favor of this standard explanation is that there is indeed carryover, as is proven by the empirics with multiple chosen event-units (seconds, days, life, etc.). However, this carryover says nothing about the actual event-units as experienced and/or perceived by people. To illustrate my point: just because we ask evaluations of the day or week, that does not necessarily entail that we experience these as actual event-units; we might for all we know see hours as the actual event-units.

This has implications due to the nature of the peak-end effect: it is inherently a peak and an end of an event-unit. So, we can choose every event-unit we want, but that does not make it the most effective unit; this needs empirical/theoretical argument. Currently this leaves the firm without a clear guide where to put the peak effect and where the end effect. Possibilities are endless, which could lead to suboptimal placement of the peak-end effect.

This theoretical argument aside, there are natural options that can be attempted that should be effective. These would be natural environmental units such as days, or (semi) social units such as weeks. It could also be the career in its entirety at the firm. The latter would indicate strategic purpose for increasing employees' utility over time spent at the firm in order to get peak-end effects. These could all be used with realistic hope of success, while further empirics map out the particularities of event-units.

Event-Units in Modeling

So, depending on how we choose to frame our units, the modeling of options changes. Suppose units are day-like with regards to the peak-end effect, and suppose that regular work duration time is (X). An option for a peak-end effect is to add peak-end activity of duration (A). The event-unit duration then becomes (X) + (A), with the end-effect needing to be in (A). Now assume instead that units are more category-like; (X) and (A) are perceived as separate event-units, regardless of the firm arranging (A) or not. In this case the end-effect is preferably in (X), as it is the employee's impression on work that should change, rather than a random activity afterwards that only has influence via general increased positive affect; despite the fact that this could to a lesser extent also be fruitful for the firm. The two cases require different implementation. The former would do best to utilize something like facilitation by the firm, whereas the latter benefits more from shorter work hours or less demands from the last hour or so of the workday.

Assume that total work time (X) is divided into hard work time (H) followed by easy work time (E). With this assumption, the latter case, in which (X) is seen as separate, could be modeled as follows:

$$CB\text{-}analysis_{firm} = \beta H + \beta_2 E - (\beta - \beta_2) E - W + \beta_3 (I) \sqrt{E} + \varepsilon$$

- $\beta H + \beta_2 E$ stands for the benefit for the firm of the labor
- $(\beta - \beta_2) E$ stands for the cost to the firm for employees working less hard
- W stands for the cost in wages
- $\beta_3 (I) \sqrt{E}$ stands for that if a peak-end effect is obtained ($I=1$, $I=0$ otherwise), which should be the case when easy work at the last part follows hard work, then the remaining benefit is a declining-sensitivity function of the duration of E
- ε stands for the error term, encompassing contextual factors, random noise, and potential omitted variables

However, the entire peak-end effect is not expressed in this firm cost-benefit analysis. This is done

below:

$$\text{Peak - End Effect} = (W_{(t=0)} - W_{(t=1)}) + \beta_3(I) \sqrt{E} + \varepsilon$$

- $(W_{t=0} - W_{t=1})$ stands for the difference in total accepted wages by the employee due to an improvement in environment, in which $t=0$ is before the peak-end rule introduction, and $t=1$ is after.
- $\beta_3(I) \sqrt{E}$ stands for the peak-end effect benefit not already processed in the wages

Different peak-end effect functions could be tried as they might give a better fit. It is worth stressing that this is a preliminary function, especially the peak-end effect remainder, which is based on a couple theoretical arguments; nothing more.

Framework of Experimental Design

From the analysis in 3b we know that there are issues with measuring experience, but that it remains tractable due to its predictive power in combination with perceptions. However, even if the measures proxies were proficient, beginning empirical research might benefit from additional evidence. This is so due to the fact that economic evidence of employee benefit leading to firm benefit, with regards to the peak-end effect, is still absent. This absence gives the double empirical burden of i) proving that the peak-end effect is substantially affecting employees, and that ii) the employee effects in turn substantially affect firm benefits. The mediating relationship looks as follows:

(1) H0: implementation peak-end rule \rightarrow employee benefit \rightarrow firm benefit

Therefore, we also need two measurable sub-hypotheses. The first is:

(1a) H0: implementation peak-end rule \rightarrow employee benefit

This could be measured with for instance Kahneman (et.al., 2004) daily survey method. The second is the firm-related one:

(1b) H0: implementation peak-end rule \rightarrow firm benefit

The measurement of this hypothesis depends on the design of implementation. Let's here take the same design as chosen in 'event categorization'; the workday is divided into hard work and easy work at the end. In this case, implementation of the peak-end rule should lead to a positive number of the benefit part of the equation: $(W_{t=0} - W_{t=1}) + \beta_3(I) \sqrt{E}$. We could do the same for net benefit in a cost-benefit analysis after peak-end rule implementation. This would give the following hypothesis:

(2) H0: $((W_{t=0} - W_{t=1}) + \beta_3(I) \sqrt{E}) > (\beta - \beta_2) E$

This hypothesis states that the benefits are greater than the costs; the central hypothesis for the firm. That (1) is true could very well be, but if the benefit is not high enough then there is no strategic advantage to be gained. Therefore, it is important that we measure (2) properly. To start, the cost side of the equation could be measured by basic proxies of productivity. The differences between β_2 and β can then be observed and put in the formula. Furthermore, the benefit side of the equation is easily measurable with regards to wages; a simple look at the data at $t=0$ and $t=1$ is sufficient. The difficulty mostly comes from the increased performance, denoted by $\beta_3(I) \sqrt{E}$. Outcome measures of firm benefit are numerous in kind, ranging from profit to organizational improvements. If we take a measure such as profit, it might be too distal in time to show up in non-longitudinal data.

Contrarily, if we take an outcome measure like employee behavior, then we also need to assume that this directly translates into firm benefit. Also, in general the choices of outcome measure and duration heavily rely on firm type and the kind of industry. Lastly, to control somewhat for other influential factors such as economic cycles, a difference-in-difference experimental design can be taken. When this is all done properly, (2) would be primary evidence for contemporary firms deciding on implementation, and (1) would be supplementary evidence that could simultaneously suggest the strategic benefit of potential creative future implementation-forms of the peak-end rule.

There is of course a chance that a well-done difference-in-difference design does not suffice for capturing all exogenous variables; the error term could still contain variables that heavily influence the result. The following is a non-exhaustive list of possible moderating effects of the effect-size and on how they could be handled:

- Temporal wage rigidity could cause the peak-end effect to not result in wage differences in time. This could be due to labor union pressure and/or unwilling employees that have already constrained themselves with future plans that are based on current income levels. Longitudinal measurement could account partially for this factor.
- Firm differences could be the cause of the peak-end effect hardly influencing outcomes. For instance, perhaps the peak-end effect is only significant in low-skilled labor while hardly mattering for high-skilled labor. Researching different sectors controls for this factor.
- Individual difference could cause the peak-end effect to give positive or negative group totals even though some employees benefit greatly while it simultaneously hinders others. Take for instance the Liersch and McKenzie (2009) critique: the group-observable phenomenon of the peak-end effect does not entail individual phenomena. There could for instance be a division between *peak-enders* and *averagers*; those that don't and do uniformly aggregate utility. Putting the peak-end effect on an *averager* is not worthwhile, and could even be burdensome under some conditions. Therefore, the daily survey method might be important for testing whether there are large discrepancies between individuals. To compare, this heterogeneity issue is similar to the previous analysis of different employee types, and the contrasting firm policies that fit these different types. In the current case, if there are indeed large employee differences, then that suggests that a facilitating option in which individuals can better sort themselves in accord with their preference can/should be empirically tested instead of the current design.

To continue on the point of different designs of the last bullet point: there are plenty of options that mimic the design provided in this section. The only major adjustment that needs to be made is the cost side of the equation. For instance, a facilitation design with mediation rooms could be done without much extra theoretical work. In continuation of the experiment, supplementary techniques like nudge and boost can also be used either as a package design or as further control factors. Theoretically, these designs all have merit. Furthermore, due to this merit, there is also a good chance that there are firms that would be willing to participate in such experimental studies. However, if these experiments limit themselves to firms that self-select into participating in these experiments, then that curbs the expressive power of the evidence. Nevertheless, at the very least, it does in that case remain informative for firms that are alike to the participating firms.

Overall Conclusions

As it turns out, there is no such thing as the peak-end effect in personnel economic research. This paper has argued that there is enough evidence from psychology with corresponding economic

mechanisms that suggest the peak-end effect is worth researching. The evidence from psychology comes from the job demands-resources model and the broaden-and build model; the economic mechanisms for firm benefit are lower accepted wages and increased productivity. Moreover, theoretical pros and cons to the peak-end effect in firms, with the addition of several forms of implementation, have also been shortly discussed. These should be kept in mind, as they could become relevant, or are relevant now, to specific firms. Furthermore, a theoretical account was given in section 3 on ethics, measurement, and theoretical frameworks with a corresponding empirical experiment. This could be used as preliminary material, allowing firms and researchers to embark on a path of empirical work and potential future investment.

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Appendix

A.1 Lazear (2009) Personnel Economics in Practice

1. Incentives

The Trade-Off Between Risk and Incentives
 Distortions in Performance Measures
 Subjective Measures of Performance
 Relative Performance Evaluation
 Alternative to Incentives I – Monitoring
 Alternative to Incentives II – Intrinsic Rewards
 Responses to Incentives – Empirical Studies
 Empirical Relevance of the Risk/Incentive Trade-off

2. Matching Firms and Workers

Learning Models
 Asymmetric Information Models
 Firing and Displacement

3. Compensation

The Level of Compensation
 The Mix of Compensation
 Equity Ownership
 Executive Compensation

4. Skill Development

5. Organization of Work

Job Design
 Teams, Worker Interaction, and Human Resource Practices
 Hierarchies

A.2 Remembered Utility = Perception

My only nitpick on Kahneman's distinction is that at t_3 , it should be perception utility rather than remembered utility. The evidence for t_3 utility comes from remembering experiments, and people's preferences for remembering positive memories. However, t_3 utility is not limited to memory; it is also about how the memory is perceived, the context of the situation, and how the memory is retrieved. Un-controversially so, memory retrieval is not exact, but rather based on filling in techniques, encompassing current beliefs and desires (citation); even Kahneman talks about this in his Bentham paper. Furthermore, "remembered utility" is able to change in an instant, even though the memory stays the same, by a mere change in perception. This change in perception could be due to a shift in current preferences, due to a shift in future goals, and many more reasons.