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People Adapt More Slowly to Social Income Changes Than to Temporal Income Changes

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People hedonically adapt to most changes, but they adapt more slowly to some changes than to others. This research examines hedonic adaptation to income changes, and asks whether people adapt more slowly to social or temporal income changes. Four experiments, manipulating the actual pay rate of online workers, find that people adapt more slowly to social income changes (e.g., a decrease in others' income but not in one's own income) than to temporal income changes (e.g., an increase in everyone's income). This pattern holds for both negative changes (Experiment 1) and positive changes (Experiments 2, 3, and 4) and can be explained by a differential-consideration account (Experiment 3). These results suggest that in the short run, both temporal and social changes influence one's hedonic experience, but in the long run, what influences one's hedonic experiences is how much one earns relative to how much others earn, and not how much one earns now relative to how much one earned in the past. This research enriches the existing literature on hedonic adaptation, and on social versus temporal changes, and yields practical implications for the impact of income changes on subjective well-being over time.

Public Significance Statement

Four experiments manipulate the actual pay rate of online workers and find that a social income change (e.g., a decrease in others' pay rate but not yours) produces a longer-lasting hedonic effect than a temporal change (e.g., an increase in everyone's pay rate), suggesting that in the short run, both temporal and social changes matter, but in the long run, what matters most is the comparison between your current income and others' current income, not the comparison between your current income and your past income.

Keywords: hedonic adaptation, happiness, social comparison, temporal comparison

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It is well known that the hedonic impacts of most changes fade over time, a phenomenon often referred to as hedonic adaptation (Diener, Lucas, & Scollon, 2006; Frederick & Loewenstein, 1999; Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 1998; Helson, 1964; Kahneman & Thaler, 2006; Loewenstein & Ubel, 2008; Lyubomirsky, 2011; Wilson & Gilbert, 2008). However, we know less about the factors that influence the rate at which the hedonic impact of a change fades. Existing research has identified some such factors, including, degree of certainty (Kurtz, Wilson, &

Gilbert, 2007; Yang, Gu, & Galak, 2017), sentimental value (Yang & Galak, 2015), social support (Frederick & Loewenstein, 1999; Wortman & Lehman, 1985), and inherent versus learned preferences (Hsee, Yang, Li, & Shen, 2009; Tu & Hsee, 2016). For example, Kurtz et al. (2007) found that participants who were shown two gifts had a positive mood for longer if they were uncertain about which gift they would receive than if they knew that they would receive both gifts for sure, even though two gifts objectively dominate one gift, thereby suggesting that uncertainty can slow down hedonic adaptation. Yang and Galak (2015) found that participants' happiness derived from the same gift lasted longer if the gift was from a romantic partner than if the gift was from the experimenter, suggesting that sentimental value can slow down hedonic adaptation.

This research focuses on income changes and examines a hitherto-overlooked determinant of the hedonic adaptation rate of an income change—whether the change is temporal or social.

An income change is either negative or positive, and either temporal or social. Suppose that at your firm, everyone has been working the same job and receiving the same pay rate. One day, the company changes its pay policy. Consider the following four alternative types of changes:

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Temporal negative change (TC−): the company reduces everyone's pay rate, including yours;

Social negative change (SC−): the company increases the pay rate of some workers, but maintains the pay rate of others, including yours;

Temporal positive change (TC+): the company increases everyone's pay rate, including yours;

Social positive change (SC+): the company decreases the pay rate of some workers, but maintains the pay rate of others, including yours.

Both temporal and social negative changes will likely make you unhappy. The temporal negative change will make you unhappy because your current income is lower than your past income; the social negative change will make you unhappy because your current income is lower than others' current income (Gerhart & Rynes, 2003; Festinger, 1954; Hagerty, 2000; Hsee, Shen, Zhang, Chen, & Zhang, 2012; Perez-Truglia, 2016; Steffel & Oppenheimer, 2009). By the same token, both temporal and social positive changes will likely make you happy.

In this research, we study the following question: Within each valence category (either negative or positive), do people adapt more slowly to a temporal change or to a social change?

It is important to note that we do not compare the magnitude of the impact of a negative versus a positive change, as this has already been studied (e.g., Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001; Kahneman & Tversky, 1984). It is known that people react more strongly to bad events than to good events, and adapt more slowly to bad events than to good events (Baumeister et al., 2001); the pain of losing a given amount of money is stronger than the pleasure of gaining the equivalent amount of money (Kahneman & Tversky, 1984). Instead, we compare temporal and social changes within each valence domain; namely, we compare TC− with SC−, and TC+ with SC+.

It is also important to note that we do not study whether people care more about temporal or social income changes, as this has also been studied (e.g., Adams, 1963; Bazerman, Schroth, Shah, Diekmann, & Tenbrunsel, 1994; Gerhart & Rynes, 2003; Morewedge, Zhu, & Buechel, 2019; Rynes & Gerhart, 2000). For example, in one study, participants were more likely to participate in an experiment in which everyone would earn \$7 than an experiment in which they would earn \$8 but others would earn \$10, suggesting that people are influenced more by the comparison of their own payment and others' payment than by the absolute magnitude of their own payment (Bazerman et al., 1994).

We hypothesize a *differential-adaption effect*: People adapt more slowly to a social income change than to a temporal income change. We expect this effect to hold even if the two types of changes have similar initial impacts. This hypothesis applies to both positive and negative changes.

We attribute the differential-adaptation effect to *differential consideration*. At any time after a change, your happiness with your current income is influenced by the difference between your current income and some reference income. In the temporal-change case, the reference income is your past income; in the social-change case, the reference income is others' current income.

In each case, the extent to which your happiness is influenced by the difference between your current income and the reference income depends on how strongly you consider the reference income.

We posit that your consideration of the reference income declines faster in the temporal-change case than in the social-change case. In the temporal-change case, the reference income (i.e., your past income) naturally draws your consideration right after the change, but over time, this information becomes less relevant and hence will be considered less (Garbinsky, Morewedge, & Shiv, 2014; Lyubomirsky, 2011; Wilson, Wheatley, Meyers, Gilbert, & Axson, 2000). Accordingly, the influence of the difference between your current income and your past income dissipates over time, and the hedonic impact of the temporal change does not last long.

In the social-change case, by contrast, the reference income (i.e., others' current income) remains present after the change and hence continues to draw your consideration. Thus, the influence of the difference between your current income and others' current income does not decline over time as precipitously as in the temporal-change case, so the hedonic impact of the social change lasts longer than that of the temporal change.

In short, we hypothesize a differential-adaptation effect, in which people adapt more slowly to a social change than to a temporal change, and we expect the effect to hold even if the initial impacts of the temporal and social changes are similar. This effect implies a 2 (type of change: temporal vs. social) $\times$ 2 (time after change: right after vs. long after) interaction. We expect to find this interaction effect for both negative and positive changes.

Overview of Experiments

We report four experiments testing the above hypotheses. Experiments 1, 2, and 4 tested our differential adaptation hypothesis. Experiments 1, 2, and 3 manipulated the type of income changes (temporal or social) by varying pay rate structures. Specifically, we kept the prechange pay rates identical between the temporal-change and the social-change conditions so as to establish a common baseline, and varied the postchange pay rates between the two conditions. Experiment 1 focused on negative changes, and Experiments 2 and 3 focused on positive changes. In addition, Experiment 3 explored the underlying mechanism of the differential adaptation effect by testing the differential consideration hypothesis.

Experiment 4 adopted a subtler manipulation of the type of income. Instead of imposing different postchange pay rates between the social-change and the temporal-change conditions, this experiment kept both the prechange and the postchange pay rates consistent between the two conditions, and manipulated the type of change via framing—either highlighting the change's temporal element or highlighting the change's social element.

We conducted all experiments on MTurk, not only because MTurkers are easy to recruit but also because MTurkers are real workers and care about their incomes. Like other experiments studying hedonic adaptation (Nelson & Meyvis, 2008; Redden, 2008; Yang et al., 2017), our experiments had short timelines and examined only selected factors. Our experiments were miniature abstractions of reality, prioritizing cleanliness and internal validity over richness and external validity. But unlike the stereotypical

MTurk study, which adopts hypothetical scenarios, all of our experiments manipulated the real pay rates of the workers and measured their happiness.

This research was approved by the IRB of the University of Chicago (IRB17-1339, IRB19-0965). Based on previous papers with similar experimental paradigms on hedonic adaptation (Yang & Galak, 2015; Yang et al., 2017) and social comparison (Morewedge et al., 2019), we set the sample sizes in all experiments a priori with the same standard—100 participants per cell if the time after change was a between-subjects factor (Experiment 1) and 200 participants per cell if the time of change was a within-subjects factor (Experiments 2–4).

Experiment 1

Method

Experiment 1 tested our differential-adaptation hypothesis in the domain of negative changes. We aimed to recruit 500 workers (100 per condition) from MTurk and obtained completed responses from 513 workers (313 females; $M_{\text{age}} = 34.63$). They were randomly assigned to five conditions—one baseline condition and four main conditions. The baseline condition was executed before a pay-rate change. The four main conditions were executed after the pay-rate change and constituted a 2 (type of change: temporal vs. social) $\times$ 2 (time after change: right after vs. long after) between-subjects design.

All participants received the following general instructions: “During the study, you will be asked to perform a series of short brand-evaluation tasks. In each task, you will see a never-used brand name (e.g., “Silin”) and will judge what product category you think this brand name fits best (e.g., shoes, cars, etc.). There are no right or wrong answers; we just want to know your opinions. By completing each task (i.e., judging each brand name), you will earn some money. Your total earning for the entire study consists of two parts: (a) a base payment of \$0.20, and (b) the sum of the money you earn for completing each task.”

Participants further read, “Please note: For the first few tasks, the rate for every worker will be the same. For the remaining tasks, the rate may change. It is possible that the rate for everyone will change; it is also possible that the rate for some workers will change but the rate for other workers will remain the same. Whose rate will change and whose rate will remain is determined randomly by the computer.”

After receiving the general instructions, participants completed 20 individual tasks. At the end of each of the first four (prechange) tasks, participants read, “For this task, the pay rate for everyone is 3c.” At the end of each of the subsequent (postchange) tasks, participants in the temporal-change condition read, “For this task, the pay rate for everyone is 2c,” while participants in the social-change condition read, “For this task, the pay rate for some workers is 4c and the pay rate for others including you is 3c.” (Since we used the same prechange rate in the two conditions to establish a common baseline, it was mathematically impossible to use the same postchange rate. As we will explain later, the unequal postchange rates actually worked against the predicted effect and thus offered more robust support for our hypothesis).

The dependent variable was happiness (hedonic experience). To minimize possible carryover effects, we measured happiness only

once in each condition: at the end of the 3rd task in the before-change (baseline) condition, at the end of the 5th task in the right-after-change condition, and at the end of the 20th task in the long-after-change condition. In each case, we asked, “How do you feel about your pay rate now?” after participants saw the pay rate information for the given task. Participants answered on a scale ranging from 0 (*very bad*) to 100 (*very good*).

At the end of the experiment, we asked participants to recall their and others’ pay rates for the first few tasks and for the subsequent tasks. Ten participants failed to recall all of the information correctly. We analyzed the data both including and excluding those participants and found no qualitative differences, so the results reported below are from the analysis that included all participants.

Results and Discussion

Figure 1 and the accompanying table present the results. To test the differential-adaptation effect, we conducted a 2 (type of change: temporal vs. social) $\times$ 2 (time after change: right after vs. long after) ANOVA on the four main conditions. The analysis found the predicted interaction, $F(1, 414) = 7.80, p = .005, \eta_p^2 = .018$. Not central to our theory-testing, the ANOVA also found a type-of-change main effect, $F(1, 414) = 9.49, p = .002$, but no time-after-change main effect, $p = .274$.

Further analyses revealed that right after their respective pay-rate changes, participants in the temporal-change condition did not feel differently from participants in the social-change condition, $F(1, 414) = 0.04, p = .840$, and both groups were less happy than the participants in the before-change (baseline) condition, $t(196) = 3.39, p = .001$, and $t(195) = 3.90, p < .001$, respectively.

Over time, however, the effect of the temporal change waned, while the effect of the social change remained. Specifically, in the temporal-change condition, participants were less unhappy long after the change than right after the change, $F(1, 414) = 7.56, p = .006$, suggesting they had adapted to the temporal change. In the social-change condition, however, participants were just as unhappy long after the change as right after the change, $F(1, 414) = 1.44, p = .231$, suggesting they had not adapted to the change. (This result does not imply that people never adapt to social changes; rather, it suggests that people adapt more slowly to social changes than to temporal changes.) The different adaptation rates translated into lower happiness in the social-change condition than in the temporal-change condition long after the respective pay-rate changes, $F(1, 414) = 17.59, p < .001$, even though participants were equally unhappy right after the change. Notably, participants in the social-change condition were less happy than their counterparts in the temporal-change condition even though the former were actually earning more (3c/task) than the latter (only 2c/task).

Experiment 1 provided initial evidence for our differential-adaptation hypothesis: a social change produces a longer-lasting hedonic impact than a temporal change.

Experiment 2

Experiment 2 extended Experiment 1 in multiple ways. First, while Experiment 1 examined negative changes, Experiment 2 examined positive changes. Second, while Experiment 1 asked different participants to report happiness at different times, Experiment 2 asked the same participants to report happiness at different times. This within-

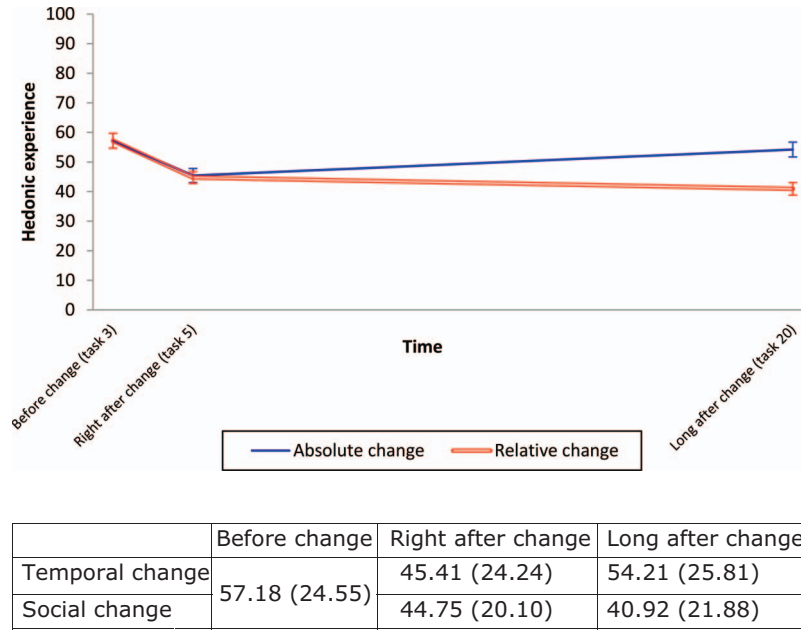


Figure 1. Results of Experiment 1: A social negative change (from 3c for everyone to 4c for others and 3c for participants) had a longer-lasting negative hedonic effect than a temporal negative change (from 3c for everyone to 2c for everyone). Participants rated hedonic experience on a 0–100 scale, with greater numbers indicating better experience. Please see the detailed means (*SDs*) in the above table. See the online article for the color version of this figure.

participants procedure made Experiment 2 a stronger test of our hypothesis because it increased the risk that participants would carry their responses from one time to another time and decreased our chance of detecting the differential-adaptation effect.

Finally and most importantly, Experiment 2 addressed a potential alternative explanation for the finding in Experiment 1. In Experiment 1, after a pay-rate change, the temporal-change condition did not remind participants of their past rate, but the social-change condition reminded participants of others' current income. Thus, the result of Experiment 1 could be attributed to the differential availability of the reference information between the two conditions (an alternative explanation) rather than the differential consideration of the reference information (our explanation).

Both differential availability and differential consideration can be considered forms of differential accessibility, but they are psychologically different. Differential availability concerns objective accessibility (the reference information is present in one condition but absent in the other), while differential consideration concerns subjective accessibility (people pay more attention to the reference information in one condition than in the other).

In Experiment 1, as well in many real-world situations, we believe that both differential availability and differential consideration contributed to the differential-adaptation effect. According to our theory, however, differential consideration alone is sufficient to produce the effect, so in Experiment 2, we reminded all participants of their past pay rate after each task. The replication of the differential-adaptation effect in such a context would support our differential-consideration explanation and rule out the alternative differential-availability explanation.

Method

Because this experiment used a within-participants time manipulation, which increased the risk of carryover effects and hence decreased our chance of detecting the differential-adaptation effect, we recruited twice as many participants per condition as in Experiment 1. We aimed to recruit 400 workers (200 per condition) from MTurk; we obtained completed responses from 410 workers (257 females, $M_{\text{age}} = 34.97$). They were randomly assigned to two conditions: temporal-change and social-change.

All participants received the following general instructions: "During the study, you will perform a series of short tasks. In each task, you will see a code (e.g., 'x78pgs3g') on the screen, and your job is to type the code in a textbox. By completing each task (i.e., correctly typing the code), you will earn some money. Your total earning for the entire study consists of two parts: (a) a base payment of \$0.20 and (b) the sum of the money you earn for completing each task. Please note: For the first few tasks, we will pay everyone the same rate. For the subsequent tasks, we may change the pay rate for some workers but keep the pay rate for other workers, or we may change the pay rate for everyone."

After reading the general instructions, participants completed 23 individual tasks. (In each task, participants had to enter the code correctly; otherwise, they would be asked to reenter it.) At the end of each of the first four (prechange) tasks, everyone read, "We pay everyone the same rate for this task: it is 2c." At the end of each of the subsequent (postchange) tasks, participants were first reminded of the past pay rate and then learned the current pay rate. The temporal-change condition stated, "For the first few tasks, we paid everyone the same rate; it was 2c. We have now increased the pay rate for

everyone. For everyone, the pay rate now is 3c.” The social-change condition stated, “For the first few tasks, we paid everyone the same rate; it was 2c. We have now decreased the pay rate for some workers but kept the rate for other workers. For some workers the pay rate now is 1c. For others, including you, the rate now is still 2c.”

We measured happiness at the end of the 3rd task (before-change), 5th task (right-after-change), and 23rd task (long-after-change).¹ Each time, we asked, “How good do you feel about your pay rate now?” Participants answered using a scale that ranged from 0 (*not good*) to 100 (*very good*).

After they finished all of the tasks, participants were asked to recall their and others’ pay rates for the first few tasks and for the subsequent tasks. Two failed to recall all of the information correctly. We analyzed the data both including and excluding those participants and found no qualitative differences, so we included all participants in the results we report below.

Results and Discussion

Figure 2 and the accompanying table display the results. To test our prediction, we conducted a 2 (type of change: temporal vs. social, between-participants) $\times$ 2 (time after change: right after vs. long after, within-participants) mixed ANOVA. The analysis found the predicted interaction, $F(1, 408) = 11.85, p = .001, \eta_p^2 = .028$. Not central to our theory, the ANOVA found no type-of-change main effect, $p = .526$, but a time-after-change main effect, $F(1, 408) = 14.85, p < .001$.

Further analyses revealed the following: Before their respective pay-rate changes, participants in the two conditions did not feel differently, $t(408) = 0.49, p = .624$, indicating a successful random assignment. Right after their respective pay-rate changes, participants in the two conditions felt similarly happy, $F(1, 408) = 1.27, p = .261$, and both groups were happier right after the change than right before it, $t(207) = 10.30, p < .001$, and $t(201) = 4.74, p < .001$, respectively, indicating that the temporal and social changes produced similar initial hedonic effects.

However, the effects diverged over time. In the temporal-change condition, participants were not as happy long after the change as right after the change, $F(1, 408) = 27.00, p < .001$, suggesting that they had adapted to the temporal positive change. In the social-change condition, however, participants were just as happy long after the change as right after the change, $F(1, 408) = 0.08, p = .773$, suggesting that they did not adapt to the social positive change. Because of the different adaptation rates, participants in the social-change condition were significantly happier than participants in the temporal-change condition long after their respective pay-rate changes, $F(1, 408) = 3.94, p = .048$, even though they were equally happy initially, and even though the participants in the social-change condition were now earning less (only 2c/task) than their counterparts in the temporal-change condition (3c per task).²

Experiment 2 replicated Experiment 1 in the domain of positive changes. Unlike Experiment 1, Experiment 2 asked the same participants about their happiness at different times throughout the study. Our replication of the differential-adaptation effect attests to the robustness of the effect.

Furthermore, unlike Experiment 1, Experiment 2 continued to remind participants of their past pay rate long after the pay-rate

change. The fact that the social change still produced a longer-lasting impact than the temporal change means that the effect is not merely due to the differential availability of the reference information but rather to the differential consideration of the equally available reference information.

Experiment 3

Method

Experiment 3 expanded our exploration of positive changes by further testing our differential-adaptation hypothesis as well as its underlying mechanism. As in Experiment 2, we aimed to recruit 400 workers (200 per condition) from MTurk, and we obtained completed responses from 396 workers (242 females, $M_{\text{age}} = 35.66$). They were assigned to two conditions: temporal-change and social-change.

All participants received the following general instructions: “During the study, you will perform a series of short tasks. In each task, you will see a code (e.g., ‘x78pgs3ergtgeee6vfd8’) on the screen, and your job is to type the code in a textbox. By completing each task (i.e., correctly typing the code), you will earn some money. Your total earning for the entire study consists of two parts: (a) a base payment of \$0.20 and (b) the sum of the money you earn for completing each task.”

To make the rate change seem more natural, we further instructed, “Please note: 1. Workers in this study will be assigned to either a Red Condition or a Blue Condition. 2. For the first few tasks, we will pay everyone the same pay rate. 3. For all subsequent tasks, we may change the pay rate of everyone, or we may change the pay rate of the workers in one condition and keep the pay rate of the workers in the other condition.”

All participants were told that they were assigned to the Blue condition. Each participant then completed 20 individual tasks. For each of the first four (prechange) tasks, the pay rate was 2c for everyone. For each of the subsequent (postchange) tasks, participants in the temporal-change condition learned that the pay rate would be 3c for both the Red and Blue conditions, while participants in the social-change condition learned that the pay rate would be 1c for the Red condition and 2c for the Blue condition.

Unlike the other experiments, this experiment presented more comprehensive pay-rate information. Specifically, at the end of each task, participants saw a table that included all past and current rates. For example, at the end of the 8th task (Task H) in the temporal-change condition, participants saw the table in Figure 3.

The social-change condition presented instead the table in Figure 4.

¹ Out of curiosity, we also measured hedonic experience at an intermediate time and found that it lay between the experience at the right-after-change time and the experience at the long-after-change time; see online supplemental materials for details.

² Although non-significant, there was still a difference in pre-change (baseline) feelings between the temporal-change and the social-change conditions in Experiments 2, 3, and 4. The analyses reported in the main text did not control for this difference. Analyses that controlled for this difference produced similar results; see online supplemental materials for details.

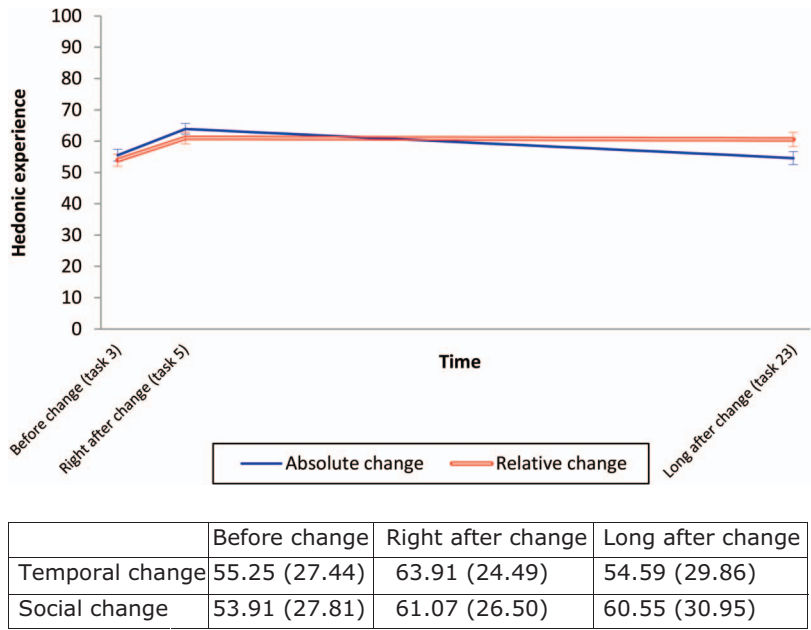


Figure 2. Results of Experiment 2: a social positive change (from 2c for everyone to 1c for others and 2c for participants) had a longer-lasting positive hedonic effect than a temporal positive change (from 2c for everyone to 3c for everyone). Participants rated hedonic experience on a 0–100 scale, with greater numbers indicating better experience. Please see the detailed means (SDs) in the above table. See the online article for the color version of this figure.

We measured happiness at the end of the 3rd task (before-change), 5th task (right-after-change), and 20th task (long-after-change). Each time, we asked, “How happy are you about your pay rate for the current task?” Participants answered on a scale anchored by 0 (*not very happy*), 50 (*somewhat happy*), and 100 (*extremely happy*).

In addition to the main dependent variable (happiness), we also explored the underlying process (consideration) by asking participants in each of the type-of-change conditions to indicate the extent to which they considered the reference income in their respective condition when indicating their feelings. Note that in the temporal-change condition, the reference income was one’s past income, and in the social-change condition, the reference income was others’ current income. Thus, in the temporal-change condition, we asked, “When you indicated how you felt about your pay rate for the current task, did you consider your pay rate for Tasks A–D in the above table?”; in the social-change condition, we asked, “When you indicated how you felt about your pay rate for the current task, did you consider the other condition’s workers’ pay rate for the current task in the above table?” In each condition, we asked the question twice: at the end of the 5th task (right-after-change)

and at the end of the 20th task (long-after-change). Participants answered on a scale that ranged from 0 (*not much*) to 100 (*very much*).

Results and Discussion

Figure 5 and the accompanying table present the results. To test our theory, we conducted a 2 (type of change: temporal vs. social, between-participants) $\times$ 2 (time after change: right after vs. long after, within-participants) mixed ANOVA. The analysis found the predicted interaction, $F(1, 394) = 13.51, p < .001, \eta_p^2 = .033$. Not central to our theory, the ANOVA found no type-of-change main effect, $p = .285$, but did find a time-after-change main effect, $F(1, 394) = 26.75, p < .001$.

Further analyses revealed the following: Before their respective changes, participants in the two conditions did not feel differently, $t(394) = 0.74, p = .457$, indicating a successful random assignment. Right after their respective changes, participants in the two conditions were similarly happy, $F(1, 394) = 0.24, p = .621$, and both groups were happier than they had been before the change, $t(189) = 7.60, p < .001$, and $t(205) = 7.65, p < .001$, respectively, suggesting that the temporal and social changes produced similar initial effects. In the

Condition	Task A	Task B	Task C	Task D	Task E	Task F	Task G	Task H
Red	2c	2c	2c	2c	3c	3c	3c	3c
Blue	2c	2c	2c	2c	3c	3c	3c	3c

Figure 3. The table presented at the end of the 8th task in the temporal-change condition.

Condition	Task A	Task B	Task C	Task D	Task E	Task F	Task G	Task H
Red	2c	2c	2c	2c	1c	1c	1c	1c
Blue	2c	2c	2c	2c	2c	2c	2c	2c

Figure 4. The table presented at the end of the 8th task in the social-change condition.

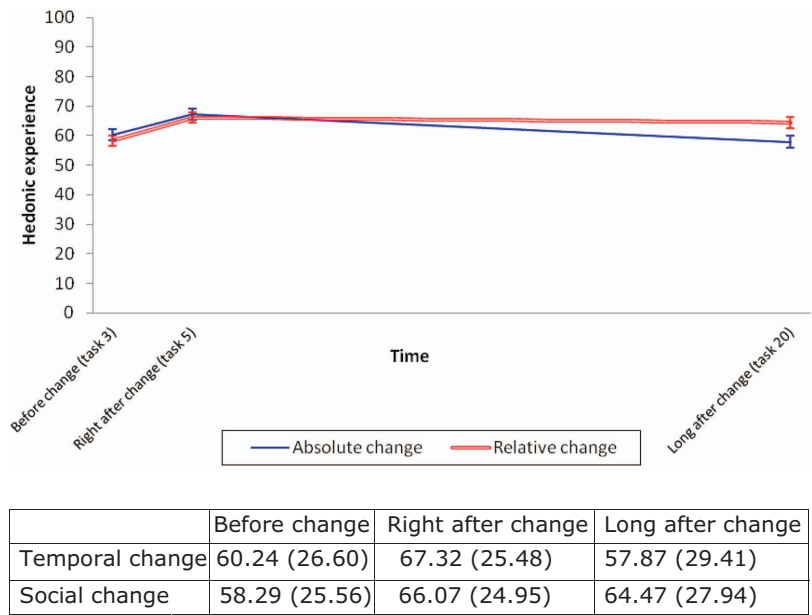


Figure 5. Results of Experiment 3: A social positive change (from 2c for everyone to 1c for others and 2c for participants) had a longer-lasting positive hedonic effect than a temporal positive change (from 2c for everyone to 3c for everyone). Participants rated hedonic experience on a 0–100 scale, with greater numbers indicating better experience. Please see the detailed means (SDs) in the above table. See the online article for the color version of this figure.

temporal-change condition, however, participants were not as happy long after the change as right after the change, $F(1, 394) = 37.62, p < .001$, while participants in the social-change condition were just as happy long after the change as right after the change, $F(1, 394) = 1.17, p = .281$, indicating that the social change produced longer-lasting effects than the temporal change. Consequently, long after their respective changes, participants in the social-change condition were happier than participants in the temporal-change condition, $F(1, 394) = 5.24, p = .023$,² even though the former group earned less.

Regarding processes, a 2 (type of change) $\times$ 2 (time after change) ANOVA on the consideration ratings found a significant interaction, $F(1, 394) = 16.52, p < .001, \eta_p^2 = .04$, supporting our differential-consideration explanation. Specifically, participants in the temporal-change condition gave significantly less consideration to their past pay rate long after the change than right after the change ($M = 72.63$ and $60.42, SD = 26.39$ and $33.90; F(1, 394) = 30.86, p < .001$), while participants in the social-change condition gave similar consideration to others' current pay rate long after the change and right after the change ($M = 56.28$ and $56.46, SD = 34.51$ and $34.35; F(1, 394) = 0.01, p = .934$). The ANOVA also found a type-of-change main effect, $F(1, 394) = 12.28, p = .001$, and a time-after-change main effect, $F(1, 394) = 15.60, p < .001$.³

In summary, Experiment 3 replicated the results of the other studies and lent further support to our differential-adaptation hypothesis. Moreover, it provided process evidence for our differential-consideration explanation.

Experiment 4

Experiment 4 tested our hypothesis with a subtler manipulation of the type of change. In the previous studies, participants

in the temporal-change condition and the social-change condition experienced different pay-rate changes and therefore received different final payments. In Experiment 4, we used identical pay-rate changes in the temporal-change and the social-change conditions; the conditions varied only in the framing of the pay-rate changes. Specifically, in both conditions, participants learned that the initial pay rate was 1c; participants then learned that they would receive 2c for subsequent tasks while other workers would continue to receive 1c. This pay-rate change was communicated in different frames: In the temporal-change condition, participants were reminded of the difference between their past pay rate and their own current pay rate (i.e., the temporal-change element); in the social-change condition, participants were reminded of the difference between their current pay rate and others' current pay rate (i.e., the social-change element). We hypothesized that participants in the temporal-change condition would still adapt more quickly to the payment increase than would their counterparts in the social-change condition, even though the two conditions entailed the same payment structure.

Method

As in Experiments 2 and 3, the time after change was a within-subjects factor in Experiment 4. Because of this, we aimed to recruit the same number of participants per condition for Experiment 4 as for Experiments 2 and 3, and we obtained

³ For an explanation for the type-of-change main effect on consideration, see online supplemental materials for details.

completed responses from 400 workers (255 females, $M_{\text{age}} = 36.63$). They were randomly assigned to two conditions regarding type of framing: temporal-change and social-change.

All participants received the following general instructions: “During the study, you will perform a series of short tasks. In each task, you will see a code (e.g., “x78pgs3”) on the screen, and your job is to type the code in a textbox. By completing each task (i.e., correctly typing the code), you will earn some money. Your total earning for the entire study consists of two parts: (a) a base payment of \$0.20 and (b) the sum of the money you earn for completing each task.”

Please note: Workers in this study will be assigned to either a constant-rate condition or a variable-rate condition. Who will be assigned to which condition is randomly decided by the computer and is unrelated to their performance. For participants in the constant-rate condition, the pay rate is always 1c per task. For participants in the variable-rate condition, the pay rate may change from task to task.”

After reading the general instructions, all participants were told that they were assigned to the variable-rate condition and completed 20 individual tasks. (In each task, participants had to enter the code correctly; otherwise, they would be asked to reenter it.) At the end of each of the first five (prechange) tasks, everyone read, “For everyone, the pay rate for this task is 1c.” At the end of each of the subsequent (postchange) tasks, participants in the temporal-change condition were first reminded of their own past pay rate and then learned their own current pay rate (“For the first few tasks, your pay rate was 1c. For this task, your pay rate is 2c.”). Participants in the social-change condition were first reminded of others’ current pay rate and then learned their own current pay rate

(“For participants in the constant-rate condition, the pay rate for this task is 1c. For you, the pay rate for this task is 2c.”).

We measured happiness at the end of the 5th task (before-change), 6th task (right-after-change), and 20th task (long-after-change). Each time, we asked, “How good do you feel about your pay rate now?” Participants answered using a scale that ranged from 0 (“not good”) to 100 (“very good”).

Results and Discussion

Figure 6 and the accompanying table display the results. To test our prediction, we conducted a 2 (type of change: temporal vs. social, between participants) $\times$ 2 (time after change: right after vs. long after, within-participants) mixed ANOVA. The analysis found the predicted interaction, $F(1, 398) = 5.14, p = .024, \eta_p^2 = .013$. Not central to our theory, the ANOVA found a marginal significant type-of-framing main effect, $F(1, 398) = 2.97, p = .085$, and a time-after-change main effect, $F(1, 398) = 20.61, p < .001$.

Further analyses revealed the following: Before their respective pay-rate changes, participants in the two conditions did not feel differently ($p = .591$), indicating a successful random assignment. Right after their respective pay-rate changes, participants in the two conditions felt similarly happy ($p = .449$), and both groups were happier than they had been before the change, $t(1,199) = 14.08, p < .001$, and $t(1,199) = 15.06, p < .001$, respectively), indicating that the temporal and social changes produced similar initial hedonic effects.

However, the effects diverged over time. In the temporal-change condition, participants were significantly less happy long after the

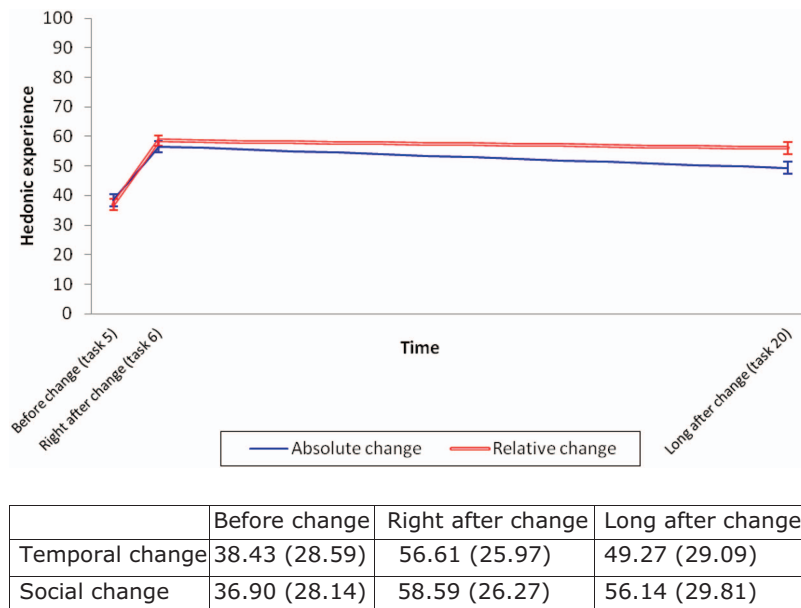


Figure 6. Results of Experiment 4: A social-positive change had a longer-lasting positive hedonic effect than a temporal-positive change, even though the social and temporal natures of the changes were manipulated through framing and the actual changes were the same (from 1c for everyone to 1c for others and 2c for participants). Participants rated hedonic experience on a 0–100 scale, with greater numbers indicating better experience. Please see the detailed means (SDs) in the above table. See the online article for the color version of this figure.

change than right after the change, $F(1, 398) = 23.16, p < .001$, suggesting that they had adapted to the temporal positive change. By contrast, in the social-change condition, participants were not significantly less happy long after the change than right after the change, $F(1, 398) = 2.58, p = .109$, suggesting that they did not adapt to the social positive change that fast. Because of the different adaptation rates, participants in the social-change condition were significantly happier than participants in the temporal-change condition long after their respective pay-rate changes, $F(1, 398) = 5.44, p = .020$, even though they were equally happy initially and despite the fact that the participants in the social-change condition were earning the same as their counterparts in the temporal-change condition.

Replicating the results of the other experiments, Experiment 4 adds another piece of evidence to our differential-adaptation hypothesis: Even though participants experienced the same pay-rate change, a simple variation in the framing of the change—emphasizing the difference either between participants' current pay rate and others' current pay rate (i.e., the social element) or between participants' past pay rate and their current pay rate (i.e., the temporal element)—affected participants' rate of hedonic adaptation to the change.

General Discussion

An object thrown into the air must fall, and so must the strength of a hedonic experience induced by change—but psychologists know much less than physicists about the rate of the fall. Just as (some) physicists determine the gravitational pull of big stars by studying small pellets in the lab, we study the hedonic effect of real-life events by conducting minimalistic experiments. Focusing on the rates of adaption to income changes, we found that both temporal and social changes influence happiness in the short run, but over time, the impact of a temporal change dissipates while the impact of a social change lingers. In the long run, what matters more is how we compare to others in the present rather than how we compare to our past selves.

Theoretical Contributions

The current research joins a growing body of literature on the factors that influence people's rate of hedonic adaptation to a change (e.g., Frederick & Loewenstein, 1999; Kurtz et al., 2007; Tennant & Hsee, 2017; Tu & Hsee, 2018; Wortman & Lehman, 1985; Yang & Galak, 2015; Yang et al., 2017). Tennant and Hsee's paper (2017) drew a distinction between comparison-independent preferences, defined as preferences whose value people could evaluate without any comparison standard (e.g., temperature), and comparison-dependent preferences, defined as preferences whose value people could tell only with a comparison standard (e.g., the size of a diamond). The authors proposed and found that people adapt more slowly to changes that involve comparison-independent preferences than to changes that involve comparison-dependent preferences. Their underlying mechanism parallels our own account: Right after a change, the objective comparison standard (i.e., the state before the change) is still salient, so both types of changes influence people's happiness, but long after the change, the objective comparison standard is no longer salient, so only changes based on comparison-independent

preferences continue to influence people's happiness. Our proposed mechanism also focuses on the salience of the comparison standard, but it goes one step further: Even if both the comparison standard of the temporal change (i.e., one's own past pay rate) and the comparison standard of the social change (i.e., others' current pay rate) are objectively present, people's subjective attention to the comparison standard of the temporal change declines more quickly than people's attention to the comparison standard of the social change.

The current research also enriches the literature on social comparison. Most existing research compares the impact of social comparison with some other factors without involving a time dimension. For example, social psychology and organizational behavior research find that sometimes people care about social comparison (the difference between their income and their colleagues' income; Loewenstein, Thompson, & Bazerman, 1989) even more than they care about their own income (e.g., Adams, 1963; Gerhart & Rynes, 2003; Rynes & Gerhart, 2000). Furthermore, this tendency is stronger in single evaluations of alternative pay schemes than in joint evaluations of these alternatives (Bazerman et al., 1994; Tversky & Griffin, 1991). Consumer behavior research demonstrates that counterfactual comparisons have a larger effect on hedonic experience if the comparisons are social than if the comparisons are nonsocial (Morewedge et al., 2019). The current research extends extant research on social comparison by introducing a time dimension—instead of studying whether a social (social-comparison) income change is more impactful than a temporal income change at a single point in time, we study the temporal adaptation rate of these two types of changes, showing that a social change has a longer-lasting hedonic impact than a temporal change even if their initial impacts are similar.

Practical Implications

Long-term happiness is as important as, if not more important than, short-term happiness. The present research shows that a temporal income change affects people's happiness only in the short term, but a social income change affects people's happiness in both the short term and the long term. A counterintuitive implication of the finding is that if managers want to maximize and prolong the happiness of some employees, it is better to reduce other employees' income rather than raising everyone's income. Of course, doing so may not be feasible or ethical, because it would hurt those whose income is reduced.

If manipulating the pay-rate structure is not feasible, managers could frame the same pay-rate change strategically to prolong happiness. For example, suppose that a company has increased the income of all its employees, while the income of employees at other companies in the industry has not increased. Based on the results of Experiment 4, in order to prolong the happiness of the employees, the company should remind its employees that their income is now higher than the income of others in the industry, rather than reminding the employees that their current income is now higher than their own past income.

Beyond the scope of income changes, this research also yields implications for other types of changes. For example, consumers often upgrade their consumptions, perhaps buying luxury outfits, cars, or even apartments. Previous research on the hedonic treadmill predicts that consumers adapt quickly to these upgrades and

thus do not derive long-term happiness from them. The present research provides a potential intervention to slow down the seemingly inevitable hedonic treadmill: reminding consumers who get an upgrade of the consumption difference between them and those who do not get an upgrade (e.g., the size difference between their upgraded car and others' current cars).

The current research also rings the alarm bell that if everyone's income increases, the overall happiness of the whole group might soon return to the prechange level. More generally, all of society keeps improving on many dimensions. Undoubtedly, each improvement boosts people's happiness right after each change, but the happiness brought by these improvements might fade away over time in the absence of social comparison.

Limitations and Future Research

With limited space and scope, this article leaves some important questions unanswered.

Our research demonstrated the differential-adaptation effect when all the reference-income information was available after the changes. What if none of it is available? We speculate that in this situation, people will adapt faster to both temporal and social changes, but they will still adapt faster to temporal changes than to social changes.

Our research used different experiments to test the proposition in the negative-change and the positive-change domains, so we could not compare across the two. Given loss aversion (Kahneman & Tversky, 1979), it would be interesting to test whether negative changes are more resistant to hedonic adaptation. Besides, we used different scales to measure hedonic experiences in different studies, and found consistent results despite the differences. It would be interesting for future research to test whether there are conditions under which different measures may produce different results.

Our experiments did not address the perceived reasons for the changes even though participants were told that the income changes were randomly determined. Future research should explore whether people hold different perceptions of the reasons for temporal versus social changes and evaluate whether that difference influences their adaptation rates.

Our research focuses on changes in income, which reflects status. We conjecture that our results apply to other status-related changes (e.g., upgrades or downgrades in jewelry), but not to changes that reflect inherent preferences (e.g., changes in room temperature; Hsee et al., 2009; Tu & Hsee, 2016).

Our research studies hedonic reactions only to the acquisition, not to the consumption, of income. People may feel differently when they acquire something than when they consume it; for example, people may care more about social comparison during acquisition than during consumption (Hsee et al., 2009). It would be interesting to test whether our hypothesis also applies to consumption of income.

Finally, we have studied only situations in which each person experiences either a temporal change or a social change. What if one experiences both? For example, suppose your company raises everyone's pay rate, but it gives others a bigger raise than it gives you. How would this combination of temporal positive change and social negative change affect your happiness? According to our theory, you may feel happy initially if the temporal positive change

is large enough, but in the long run, you will be unhappy even though you are now earning more than you did before, because the happiness from the temporal positive change will dissipate, while the unhappiness from the social negative change will remain.

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