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JUST NOTICEABLE DIFFERENCES IN POSITIVE AND NEGATIVE

PAY CHANGES

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ABSTRACT

We examine psychophysical judgments about positive and negative pay changes in a field study of 495 university employees in Finland. Consistent with prior work on "just noticeable differences" (JNDs) in pay changes, we found a stable threshold of about 8 percent for reactions (8.4 percent for effort and 7.2-9.7 percent for positive affective reactions) to pay increases, while pay increases below that level were meaningfully unnoticed. Extending prior literature, we also examined whether these threshold effects held for negative reactions to negative pay changes (implicit pay cuts) and found a different pattern of results. In line with prospect theory, the thresholds were constantly smaller for negative pay changes than for positive pay changes. We found that the pay thresholds for *negative changes in pay* were at about -5 percent (-5.7 percent for effort and from -6.8 to -3.9 for negative affective reactions). We compare the results to existing field and laboratory JND studies and discuss why thresholds were somewhat different for the variety of emotional responses studied. Several implications and recommendations for theory and further inquiry are provided.

JUST NOTICEABLE DIFFERENCES IN POSITIVE AND NEGATIVE PAY CHANGES

Performance-based pay systems are among the most popular human resource management practices that organizations use to achieve individual and organizational outcomes (Lawler & Jenkins, 1992; Gerhart & Rynes, 2003; Shaw, Duffy, Mitra, Lockhart, & Bowler, 2003). When properly implemented, pay for performance should align employers' and employees' interests, motivate higher performance, enhance the retention of high performers and in so doing, signal a performance-based culture. While their ubiquitous use suggests that organizational decision makers venerate performance-based pay, the empirical evidence on their effectiveness is mixed: it seems to produce intended outcomes such as higher motivation and productivity in some occasions, but not all (R. Heneman, 1992; Schaubroeck, Shaw, Duffy, & Mitra, 2008; Rynes, Gerhart, & Parks, 2005).

Lawler and Jenkins (1992) assert that the main reasons performance-based pay systems fail include poor performance measures, poor managerial communication, and a poor delivery system. One of the central challenges related to a successful delivery system is that a workable pay system requires sufficient funds for meaningful pay differentials (Campbell, Campbell, & Chia, 1998). Thus, one of the compelling reasons for why merit pay systems are not motivating is that pay increases are too small to be perceived as meaningful by employees. This line of reasoning is often based on the idea that small pay increases are not met with negative reactions but instead go essentially unnoticed. The point at which individuals begin to react to their pay raises has been coined the "just noticeable difference" (JND) in pay or "smallest meaningful pay increase" (SMPI) (Mitra, Gupta, & Jenkins, 1997). This conceptualization of SMPI has its roots in the study of thresholds for other sensory-related stimuli (e.g., the brightness of light or the loudness of sound; see Gescheider, 1976).

The JND construct has been conceptualized using theory from psychophysics and operationalized using the so-called 'Weber's law'[1] (Champlin & Kopelman, 1991; Futrell & Varadarajan, 1985; Hinrichs, 1969; Mitra, et al., 1997; Mitra, Shaw, Gupta, & Wurtz, 2002; Rambo & Pinto, 1989). Psychophysical theories seek to understand the relationship among stimulus intensities, sensations, and associated processes (Gescheider, 1976; Gescheider & Bolanowski, 1991; Upshaw, 1974). Specifically, Weber's law of psychophysics provides the basis for establishing pay thresholds or when a difference in pay levels is meaningfully noticed by an individual. This literature provides a substantial amount of support for the applicability of Weber's law for understanding of employees' perceptions about pay systems. There is initial evidence, and perhaps a growing consensus that the JND in pay increases is about 6-7 percent of base pay (see Katkowski, Medsker, & Pritchard, 2002, for a review). The results also have major practical implications because performance-based pay changes in most contexts average well below these estimated thresholds. Hansen (2006), for example, reported that the average performance-based pay raise for *high* performers was only 4.8 percent.

Despite advances, there are a number of unanswered questions and several areas where the literature on pay raise thresholds can be advanced. First, although there is growing support for the stability of pay thresholds, the notion of a pay change threshold has, to date, been applied only to pay increases or positive pay changes. The applicability of Weber's law for negative reactions to pay reductions has intuitive theoretical appeal as well as applied value. Once unheard of, pay cuts have become common place. The current economic crisis has forced firms around the globe to opt for pay cuts instead of layoffs (Dade & Tuna, 2008). Furthermore, the growing popularity of pay-at-risk programs (e.g., Begley & Lee, 2005) raises concerns about employee perceptions of implied pay cuts. Existing literature has been silent to questions such as: "Does a pay cut of $2,500 in yearly salary

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[1] Ernst Weber, a German physician, formulated Weber's law in the 19th century to offer a quantitative relationship between changes in stimulus intensity and corresponding psychological judgmental processes (Gescheider, 1976).

evoke equally as negative a reaction as the positive reaction evoked by a pay increase of $2,500?" or "Are pay thresholds different for negative pay changes than for positive pay changes?" While prospect theory suggests that the value or utility of pay is a non-linear function of the absolute amount, and that the function for losses is steeper than the function for gains (e.g., Galanter, 1962, 1986, 1990; Kahneman & Tversky, 1979, 1984), empirical evidence with regard to negative pay thresholds is lacking.

Second, the previous research has been limited to studying only one specific affective reaction, namely the degree of happiness resulting from different pay increases. Despite broad acceptance of the deeply emotional aspect of work experience, there has been limited focus on the impact of pay changes on a variety of emotional reactions (Ashforth & Humprey, 1995; Fineman, 1993). This omission is of acute concern particularly when it comes to the toxicity of decisions about pay cuts that might be widely associated with painful multiple negative emotions (Frost, 2003; Maitlis & Ozcelik, 2004; Reid & Gonzalez-Vallejo, 2009).

Third, the earlier research has been conducted using nettlesome methods, including having individuals respond to multiple "hypothetical" pay raises (e.g., Champlin & Kopelman, 1991; Futrell & Varadarajan, 1985; Hinrichs, 1969). While the recent studies noted above corrected some of these deficiencies, they can also be criticized in terms of being conducted in unrealistic, short-term laboratory settings (e.g., Mitra et al., 1997) or in situations with a restricted variation in pay raises (e.g., Mitra et al., 2002). Additional field studies of actual pay dynamics conducted in settings with a wide range of pay changes would challenge the robustness of the existing findings. As the entirety of this research stream has been conducted using U.S.-based samples, demonstrating the stability of Weber's law and the JND in pay changes as well as exploring whether the threshold values are consistent with existing findings in a different cultural context would also be a major step forward.

In this paper, we aim to make progress in the afore-mentioned fields of study. First, the present study seeks to extend scientific knowledge on "just noticeable differences" in pay changes by

studying a context where one third of the employees experienced a negative pay change (i.e., an implied pay cut) and most others received a positive pay change (i.e., a pay increase). Second, we study a variety of possible emotional responses to these positive and negative pay changes. Third, we examine pay changes among a sample of workers in two Finnish universities – the first sample outside U.S. in JND research. A test of the stability of Weber's law in a field setting provides additional evidence concerning a "realistic" threshold as well as, in this case, also evidence of cross-cultural stability.

This paper proceeds as follows: First, we will offer theoretical basis for investigating pay thresholds. Second, we will provide methodological details about our empirical study. Third, we will provide results of the study. Finally, we will discuss implications of the results of the study.

UNDERLYING PSYCHOPHYSICAL PREMISE OF PAY THRESHOLDS

A unique aspect of our study involves study of the impact of both positive and negative changes in pay on employees' responses. Thus, this section will proceed as follows: First, we will discuss the previous psychophysical research concerning the operationalization of pay thresholds for positive changes in pay. Second, we will formulate theoretical basis for study of pay thresholds associated with negative pay changes. Finally, we will offer theoretical framework for investigating pay thresholds for multiple emotions.

Positive Change in Pay

According to Weber's law, "the change in stimulus intensity ($\Delta\Phi$) that can just be discriminated is a constant fraction (k) of the starting intensity of the stimulus (Φ)" (Gescheider, 1976, p. 3). Applied to changes in pay, it asserts that the pay threshold is a constant fraction of the starting pay level. Despite within-person constancy, this estimate has been found to be susceptible to personal and contextual factors (Guilford, 1954; Torgerson, 1958; Upshaw, 1974). Several studies have used Weber's law to investigate merit pay thresholds (Champlin & Kopelman, 1991; Futrell & Varadarajan, 1985; Hinrichs, 1969; Mitra et al., 1997; Mitra et al., 2002; Rambo & Pinto, 1989). For

example, in an experimental simulation of student workers, Mitra et al. (1997) found that the threshold for behavioral intentions for effort (e.g., work a little harder) and well as affective reactions (e.g., happiness with a merit raise) was at about 7 percent of prior base pay level. Mitra et al. (2002) attempted to replicate these findings in a longitudinal study of a merit pay system in a university hospital. These authors found support for Weber's law, but with slightly lower (about 6 percent) threshold values. This implies that a merit raise of about 6-7 percent of base pay must be offered for it to be recognized as modest, for people to feel pleased (rather than indifferent) about their raises, and motivate them to work a little harder. In all, results from about fourteen psychophysical investigations of pay raise thresholds provide support for the psychophysics approach and a strong point of departure for future investigations (Katkowski et al., 2002). On the basis of the previous research and literature on JND, we predict the following:

Hypothesis 1: The perception of the size of pay increase will be a constant fraction of employees' current pay level.

Taken together, the previous results are suggestive of the stability of Weber's fraction when applied to positive pay changes or increases, but validity of the threshold must be established through multiple systematic examinations in different contexts (McGrath, 1982).

Negative Change in Pay

A somewhat neglected aspect of psychophysical investigation of pay thresholds relates to a lack of investigation on negative changes in pay. According to "the law of situational meaning" a pay cut might be considered an event that harms or threatens the individual, and as such would produce negative emotions (Frijda, 1988). Lowered earnings level have been found to lead to a sense of relative deprivation, which in turn leads to negative affective and behavioral responses (Feldman, Leana, & Bolino, 2002). For example, the recent crisis in the airlines industry in the US has resulted in reduction in pay for various job positions that could adversely impact morale, turnover, and job performance (Bewley, 1999; Lee & Rupp, 2007).

Furthermore, people are not just assumed to perceive pay cuts as negative, but according to prospect theory, they are expected to pay more attention to losses than gains (Kahneman & Tversky, 1979, 1984). This phenomenon is often referred as to *loss aversion,* which results in a utility function that is steeper for losses than for gains (Tversky & Kahneman, 1992). Loss aversion implies that one who loses $100 will be more dissatisfied than another person will be satisfied from a $100 windfall. Loss aversion is one component of risk attitude (Köbberling & Wakker, 2005, among others). Also in the literature on affective reactions, the law of habituation and hedonic asymmetry (Frijda, 1988) suggests that people habituate to positive events that elicit positive affect but pain, or other negative affective responses might elicit stronger and more pronounced reactions. Based on the reviewed literature, we propose:

Hypothesis 2: The perception of the size of pay cut will be a constant fraction of employees' current pay level.

Hypothesis 3: The Weber fraction for pay cuts would be smaller than the Weber fraction for pay increases.

A few psychophysical studies have used "scaling task" to assess the nature of Stevens' power function[2] for positive and negative changes (i.e., utility and disutility) in monetary amounts (Galanter, 1962, 1986, 1990; Galanter & Pliner, 1974). These studies support a power function for gains and losses but show a relatively small difference in exponents for the utility and disutility functions. However, these studies rely on hypothetical changes in monetary amounts and do not assess pay thresholds for positive or negative changes in pay. As indicated earlier, Weber's law of just noticeable differences applies to "discrimination tasks" and not to scaling tasks. To the best of our knowledge, no prior study has assessed Weber fraction for negative pay changes.

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[2] Weber's law deals with discrimination judgment associated with noticeable changes in the stimulus intensity. It does not, however, offer information on the magnitude (i.e., how much) or scaling judgment on different stimulus intensity. Stevens' power function offers such a relationship. Stevens (1975) argued (and provided a large amount of supportive data) that the relationship between stimulus magnitude and sensation followed a *power* function (Gescheider, 1976).

Pay Changes and Multitudes of Emotions

The enormous body of research on pay satisfaction attests to the importance of the study of emotional reactions to pay changes (for a review, see Williams, McDaniel, & Nguyen, 2006). Changes in pay, however, can be seen as events caused by multiple agents and may elicit various, but different emotions. Discrete emotions are argued to fundamentally vary to the degree they are pleasant or unpleasant (Watson & Tellegen, 1985; Barrett & Russell, 1998), such that events that satisfy an individual's goals, or promise to do so, produce positive emotions; events that harm or threaten the individual produce negative emotions (Frijda, 1988). Pay changes involve appraisal, sometimes automatic, that help an employee decide what to feel after interpreting or explaining what has just happened (Lazarus, 1991).

According to cognitive structure theory by Ortony, Clore and Collins (1988), three broad classes of emotions can be distinguished based on the cognitive focus involvement. In addition to the *objects* themselves, one can focus on the outcomes of *events*, the agency of *actions*, or combinations of these. Two things are important in this: (a) interpretation of the event (i.e., whether the consequences are good or bad for us) and (b) interpretation of the actions of agents in the producing the outcome (i.e., emotional reactions to the attributions). If one focuses on the event outcome such as positive or negative pay change, the basic affective reaction is referred as to being pleased or displeased about the outcomes that are desirable or undesirable for one's goals. Ortony et al. (1988) suggest that an event (e.g., change in pay) may cause such emotions as hope, fear, relief, disappointment, happiness, and sadness. However, if one focuses not on events but on someone's actions related to pay change, the relevant affective reaction is referred to as approving or disapproving the actions of the agent as praiseworthy or blameworthy with respect to one's standards. That is, an assessment of the agency of pay change may lead to such emotions as pride, shame, admiration, and reproach. In addition, according to cognitive structure theory, one can simultaneously

focus on two aspects of the situation. For example if one is displeased about the outcome of an event and disapproving relevant actions, anger results.

Reid and Gonzalez-Vallejo (2009) argue that emotions are a tradable quantity, whereby multitudes of emotions combine to regulate choices. For example, Maitlis and Ozcelik (2004) argue that toxic interventions such as pay cuts may be associated with multitudes of emotions such as anxiety, apprehension, anger, indignation, fear, pity, and embarrassment. In this paper, using the framework of cognitive structure theory, we propose three classes of emotions. First, employees may react to change in pay as an event by feeling "excited and proud" or "nervous and guilty". Second, a change in pay helps formulate future pay-related expectancy (Lawler, 1971) and should invoke two future prospect-oriented emotions of "hope/determined" or "fear/afraid." Finally, employees are likely to experience emotions based on attributions about the process of changes in pay. We propose these emotions to be either "anger/hostility" associated with perceived unfairness and/or feeling "strong" for being fairly rewarded (Weiner, 1986). In short, according to cognitive structure theory, it would be fruitful to evaluate effects of changes in pay with respect to emotions that focus on events as well as agency in producing the outcome.

To summarize, this study has the following goals:

- The first goal is to derive JND estimates for positive and negative pay changes and assess the stability of these estimates (i.e. Hypotheses 1 and 2).

- The second goal is to compare the JND estimates for positive and negative pay changes (i.e. Hypothesis 3).

- In addition, we explore patterns of JND estimates for a multitude of emotional reactions.

METHOD

Participants

The data was gathered in a unique, naturally occurring event in a university environment in Finland. The university pay systems were recently changed from a seniority-based pay system to one based on performance appraisal and merit (i.e. merit pay). There was, however, a relatively small additional pay budget available (total 7.24 percent of payroll costs over the so-called transfer period from January 1, 2006 to January 1, 2008 at the first university, and October 1, 2009 at the second). Many employees earned, received pay increases, and expect to get more – but almost a third (27 percent) of the employees received an indirect pay cut. We refer to these pay cuts as indirect because during the transfer period the collective agreement guaranteed the old pay levels as long as the person would stay in the same position. At the same time, however, pay increase prospects for the employees receiving a pay guarantee were dismal for the near future. They would first need to meet performance expectations for their current pay level, and then exceed those expectations in order to have an opportunity for a pay increase. The pay increases were to be paid out gradually during the transfer period. Almost half (47.1 percent) of the pay increases were paid out when the study was conducted in February 2007.

A random sample 1,000 of academic and administrative personnel was drawn from the personnel records of two Finnish universities. Each employee was assigned an individual code, which was used to link multiple sources of data for each employee. A web-based questionnaire was sent to each participant via email using double-blind procedure. A third party not affiliated with the research team matched names to randomly assigned unique identifiers. Neither the members of the research team, nor the employer representatives who provided records-based pay data for the entire sample, were aware of the identities of those completing the questionnaires. The final sample was N=495 (N_1=248 [50 percent response rate] and N_2=247 [49 percent response rate]).

Measures

Pay Thresholds. In our study, the general JND threshold is based on conclusions drawn from specific thresholds along affective and behavioral dimensions. The behavioral intent item had seven

category labels that were identical to the one used by Mitra et al. (1997) (1=the change will make me work a lot less hard and 7=the change will make me work a lot harder). The affective reactions were measured on a 7-point category-based scale using four items depicting different positive affective reactions (determined, proud, strong and excited) and four items depicting negative affective reactions (afraid, guilty, hostile and nervous).

Because direct measures of JNDs are often used in the literature, for comparison purposes, we included two direct measures of JNDs in this study as well (i.e., cognitive magnitude and affective dimension). Subjects were asked, "Given your current monthly pay, how much would it have to change for you to notice a difference? (€/month)", and "Given your current monthly pay, how much would it have to change for you to view it positively? (€/month)"

Analysis Approach

Estimates of Pay Change Thresholds. The estimates are based on the degree of behavioral intent, or affective reactions as compared to different category labels as employed in previous research (e.g., Mitra et al., 1997; Mitra et al., 2002; Rambo & Pinto, 1989). The distribution of pay changes within a category was used to calculate the category value. The mid-point between the two successive category values provided an estimate of positive or negative pay change threshold or JND between the two categories.

Stability of the Weber Fraction. In order to assess the stability of Weber's fraction, we applied the logic of Anderson's Functional Measurement approach (Anderson, 1982; Anderson & Butzin, 1974; Knowles, 1983; Mitra et al., 1997). According to the Anderson's Functional Measurement approach, for the Weber fraction k to remain constant, the estimated size of category thresholds should increase proportionately as the value of the old or standard pay increases. In other words, when pay raises are viewed as proportions of old pay levels (i.e., when pay raises are viewed as percentages), lines showing the relationship between pay raises and category ratings should be *parallel* across different pay levels.

Statistically, there should be no interaction between base pay levels and category ratings in predicting the size of the pay raise (viewed as a percentage of base pay). On the other hand, when pay raises are viewed as absolute dollar amounts, such an interaction, or a *fan* effect should be evident. This logic implies that the presence of an interaction effect when pay raises are viewed as absolute dollars, and the absence of this interaction when pay raises are viewed as proportions, provides statistical support for the constancy of Weber's fraction. The parallel and fan propositions were examined for the two cognitive dimensions of interest (behavioral intent and affect). These propositions were tested using the General Linear Models analysis approach. In addition, we used the statistical analysis method suggested by Champlin and Kopelman (1991) to test the stability of Weber's law. According to these authors, a generalized function for Weber's law can be stated as follows:

$$JND = k \bullet Old\ Pay^b \qquad (1)$$

where, *b* is a constant. Weber's law is a special case of this equation with $b = 1$. Furthermore, equation (1) can be written as follows:

$$ln(JND) = ln(k) + b \bullet ln(Old\ Pay) \qquad (2)$$

Evidence for Weber's law can be garnered by using multiple regression to test whether the beta for "*ln*(Old Pay)" is equal to one (i.e., $b = 1$).

RESULTS

Category Values and Category Thresholds

Table 1 contains the distribution of judgments made by subjects with regard to behavioral intent dimension and one example of affect dimension (i.e., excitement). We used range of changes in pay to generate the distribution of judgments. Moreover, since the distribution of judgments were truncated, following Mitra et al. (1997), we calculated interpolated medians using the method suggested by Guilford (1954).

Positive Pay Changes. The estimates of category values as well as the pay thresholds for behavioral intent are displayed in Table 2. Similar estimates for the different positive affective reactions as a response to positive pay changes are displayed in Table 3. Mitra et al. (1997; 2002) argued that the pay threshold for behavioral intent is interpreted from the category shift in responses from "would not work differently" to "work a little harder". As for affective reactions, the thresholds correspond to a shift from "occasionally" (excited or other positive affect) versus "often" (excited or other positive affect). These values are 8.4 percent for the behavioral intent and 7.2-9.7 percent for positive affective reactions, respectively (compare with Mitra et al., 1997; Rambo & Pinto, 1989; Worley, Bowen, & Lawler, 1992; Zedeck & Smith, 1968). Future prospects and agency-based emotions "determined" and "strong" had larger JND estimates (8.5 and 9.7 percent) than event-related and well-being based positive affect "excited" (7.2 percent). Our data did not allow the JND calculation for "proud" because of low amount of responses in the categories "occasionally" vs. "often".

Insert Tables 1 through 3 about here

Negative Pay Changes. Similar to pay thresholds for pay increases, pay threshold for implied pay cuts could be defined as shift between categories "occasionally" (afraid or other negative affect) versus "often" (afraid or other negative affect). In similar fashion as for positive changes, category-based threshold for negative pay changes behavioral intent should correspond to a shift in category label from "no differently" to "a little less hard". The pay cut threshold for behavioral intent is -5.7 percent (please refer to Table 2), and the different affect dimensions vary between -6.8 percent and -3.9 percent (please refer to Table 3). These values are substantially and persistently smaller than the thresholds for positive pay changes. Thus, we can conclude that the size of Weber fraction (i.e., estimated pay threshold) is smaller for negative pay changes, providing support for our Hypothesis 3. Well-being related emotion "nervous" had a lower negative JND estimate (-3.9 percent) than those

also related to future prospects and agency attributions "afraid" and "hostile" (-4.4 and -6.8 percent). Our data did not allow the JND calculation for "guilty" because of low amount of responses in the categories "occasionally" vs. "often".

Stability of Weber's Fraction. As stated above, we tested the stability of Weber's fraction by using Anderson's functional measurement approach (Anderson, 1982; Mitra et al., 1997) as well as by using the method suggested by Champlin and Kopelman (1991). The results indicate that when pay changes are treated as absolute euros, the interaction effects for the behavioral intent dimension were marginally significant ($p < .09$) for positive changes and significant ($p < .02$) for negative changes. When pay raises are treated as a percentage, the interaction between old pay and category values for both positive as well as negative pay changes were not significant ($p > .05$). Multiple regression analysis using equation (2) (Champlin & Kopelman, 1991) indicated that b was significantly different from zero for both dimensions, but the confidence interval data suggested that it was not significantly different from 1. Taken together, these results further buttress the application of Weber's law to changes in pay levels and support the constancy of the fraction for both positive as well as negative changes. Thus, we find support for Hypotheses 1 and 2 both for the stability of Weber fraction.

Finally, we analyzed JND estimates using the direct estimation method for the total sample. For the magnitude dimension, the Weber fraction was 11.5 percent (standard deviation = 11.1 percent). For the affect dimension, the Weber fraction was 13.7 percent (standard deviation = 12.9 percent). These JND values using the direct estimation method are higher than the ones we found using category-based method, which is in line with previous investigations suggesting that when directly asked, people tend to overestimate their thresholds for pay increases (e.g., Rynes, Gerhart, & Minette, 2004).

DISCUSSION

In this paper, we report the results of a unique naturally occurring field study in Finland to study the successive categories-based pay thresholds. Subjects offered their perceptions of both positive (pay increase) and negative (implied pay cuts) changes in their pay. Consistent with previous laboratory and field research among U.S.-based samples, the pay thresholds for *positive changes in pay* were estimated to be 8.4 percent for behavioral intent and 7.2-9.7 percent for positive affective reactions. These estimates are very close in nature to estimates using the successive categories approach in Mitra et al. (1997) laboratory study (around 7 percent) and Mitra et al.'s (2002) field study (around 6 percent). Indeed, Mitra and colleagues have offered the practical guideline of pay raises in the range of 7 to 10 percent – our results in a very divergent context fall squarely within this range. The results provide support for the generalizability of Weber's law in operationalizing meaningful pay changes. Thus, these results suggest a considerable amount of stability in terms of how individuals react to positive pay changes in different contexts.

An important contribution of this paper is to assess just noticeable differences for implied pay cuts. Here, we draw from prospect theory, which argues that people are more sensitive to losses than gains (Kahneman & Tversky, 1979, 1984). Thus, according to prospect theory, a small negative change in pay level should be associated with more pronounced negative reactions than a small positive change in pay level will elicit positive reactions. We found that the pay thresholds for *negative changes in pay* were -5.7 percent for effort, and varied from -6.8 to -3.9 for different negative affective reactions. As they were constantly smaller for negative pay changes than for positive pay changes, we conclude that this study supports the contention of loss aversion with regard to even implied pay cuts, and higher sensitivity to losses than for gains.

A unique contribution of this study was to investigate psychophysical dynamics of the impact of pay changes on gamut of emotional responses by employees. Drawing from cognitive structure theory by Ortony et al. (1988), we studied emotions that focus on events as well as agency in

producing the outcome. Generally, well-being related emotions (excited and nervous) had smaller thresholds than future prospect- (determined and afraid), or agent-related emotions (hostile and strong). We were not able to estimate thresholds for purely attribution-based emotions "proud" and "guilty", suggesting that they were not very descriptive of employees' responses to pay changes.

As the results demonstrate differences in emotional reactions across multiple affective categories, we conducted a *post hoc* analysis to understand basis for such differences. This analysis revealed that for employees receiving pay increases, category-based thresholds for positive affective reactions were significantly correlated with attributions to pay changes being caused by self, supervisor, and the trade union negotiations – i.e., positive affective responses were associated with factors or actors employees had some control over. Conversely, the negative affective reactions to implied pay cuts appeared to correlate with external attributions – but also demonstrated a more complex pattern.

Negative affective reaction "afraid" was significantly correlated with attribution to the trade union influence. Affect "hostility" was significantly correlated with attribution to the group that oversaw the process of consistent application (a group consisting of members from employee and employer representatives whose task was to monitor that the system was applied consistently). Finally, affect "nervous" was significantly correlated with attribution to the organizational-level decision making. Overall, it appears that positive pay changes were attributed to factors within control whereas implied pay cuts were attributed to external factors. Pay cuts also lead to more nuanced affective attributional processes. Our *post hoc* analysis suggests that especially in the case of negative pay changes, the respondents' emotional experience varied between the different attributions. This suggests that future studies need to take a more comprehensive approach to the investigation of emotional reaction to changes in pay.

Similar to previous work on pay raise thresholds, we also employed direct estimation method to pay thresholds. This method yielded higher estimates to pay thresholds (i.e., 11.5 percent for the

cognitive dimension and 13.7 percent for the affective dimension) and was associated with significantly larger variance in estimates. It is possible that when subjects are directly asked about their estimates of meaningful pay changes, they tend to overestimate (Rynes et al., 2004). Future research needs to look into psychometric reasons causing the two methods to provide different estimates of pay thresholds.

Based on our study, several suggestions can be offered for future research effort in this area. First, with growing emphasis on pay-at-risk and variable pay (Milkovich & Newman, 2005) future research should also look into meaning of *implied* pay cuts in comparison to *direct* pay cuts. Employees' responses to pay cuts appear more complex and, thus, would require formulating a more complex theoretical model. We believe that future research should also include moderators and mediators of pay thresholds in order to develop more refined theoretical models. Although not focused on pay raise thresholds, the recent results of Schaubroeck et al. (2008) provide convincing evidence that individuals' prior expectations and confidence in the veracity of the pay system play a major role in terms of how individuals interpret their pay raises. Shaw et al. (2003) and Shaw, Duffy, Jenkins, and Gupta (1999) also demonstrated that individual differences in personality trait positive affectivity play a major role in terms of how individuals interpret their pay. Future researchers would be well-served to include these moderating factors in pay raise threshold studies. Second, more data should be collected to understand possible cross-cultural differences in the perceptions of pay changes. Third, a careful assessment of the psychometric property of different methods of estimating pay thresholds should be made.

While our research offers many new insights about the applicability of psychophysical theories to changes in pay, it suffers from some weaknesses as well. First, the current study, being a field study, suffers from a lack of control desired for testing of Weber's law (Mitra et al., 1997). Second, negative pay changes were only implied. In other words, given the nature of contract negotiated by the unions, employees most likely would not actually experience a pay cut in the short-

term, although it is likely that most would experience an implied pay cut with regard to pay increase prospects. Thus, discrimination judgment that underlies in validating Weber's law may be lacking when it comes to the estimates of pay thresholds for negative pay changes.

CONCLUSION

Just noticeable difference literature is based on the psychophysical premise that pay increases (or cuts) below a threshold will go unnoticed. There is growing support that this threshold for pay increases is at about 7-10 percent. This study observed the individual-level impact of meaningful pay increases on effort and affective reactions in a unique field-setting, where the pay system reform suggested pay increases for some employees and implicit pay cuts for others. Overall, the study provided support for stable thresholds of about 8 percent for pay increases and -5 percent for implied pay cuts. From practical perspective, our results indicate that the pay budget in situations similar to the current organization (with 7.24 percent budget) might be sufficient if employed mainly for the "top performers".

The increasing popularity of variable pay in Europe has been attributed to its impact on productivity and profitability (Milkovich & Newman, 2005; Kauhanen & Piekkola, 2006; Piekkola, 2005; Willems, Janvier, & Henderickx, 2006). Piekkola (2005), for example, found that well-designed profit sharing systems could increase profitability by 6 percent provided employees are given large profit shares (raging from 3.6 percent to 6 percent). In the current economic situation (in March, 2009), where many state budgets are running huge deficits, some companies are formally asking people to accept no raises or a cut in compensation this year to reduce layoffs. Thus, in economic downtimes, it is likely that there are no profits to share, or that the payoffs are funded by layoffs. The attributions of the causes are likely to play an important role in how employees react to negative changes in their pay. The results of this study suggest that changes in pay systems involving both pay gains and pay cuts could be complex. Employees were found to be more sensitive to even implied pay cuts and associated pay thresholds were related to a range of emotions and attributions.

Future research is needed to explore whether the JND for a pay increase would be lower and the JND for a pay cut higher in economic downtimes as employees' expectations (or tolerance for that matter) might be altered.

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TABLE 1
Frequency distribution of category judgments for new pay levels

Category Label	The Resulting Pay Change was Positive							
	0-3%	4-6%	7-9%	10-12%	13-15%	16-18%	19-21%	> 21%
The change will make me work . . .								
A lot less hard	1	6	4	1	1	1	0	2
Somewhat less hard	4	11	2	0	2	5	1	0
A little less hard	11	5	3	3	3	1	2	1
No differently	42	35	30	29	20	19	12	12
A little harder	9	3	4	4	4	5	4	3
Somewhat harder	1	2	4	3	5	2	0	3
A lot harder	0	0	0	0	0	0	0	1
	The Resulting Pay Change was Negative							
Category Label	0-3%	4-6%	7-9%	10-12%	13-15%	>15%		
The change will make me work . . .								
A lot less hard	9	1	2	2	0	3		
Somewhat less hard	8	5	3	1	1	1		
A little less hard	4	1	3	1	4	1		
No differently	14	11	6	9	3	7		
A little harder	2	0	2	0	1	1		
	The Resulting Pay Change was Positive (an example for a positive affect)							
Category Label	0-3%	4-6%	7-9%	10-12%	13-15%	16-18%	19-21%	> 21%
The change will make me excited . . .								
Never	29	22	21	16	16	8	5	4
Seldom	14	14	8	10	9	10	5	6
Once in a while	10	12	2	4	5	3	3	3
Occasionally	9	6	9	4	1	8	4	8
Often	4	4	2	4	1	2	1	0
With each passing day	1	1	0	2	2	1	1	1
All the time	0	0	0	1	1	1	0	0

TABLE 2
Category Values and Category Thresholds in the Field Study – Behavioral Intent Dimension

Category dimension/ category label	Category value (%)	Category dimension/category thresholds type	Threshold value (%)
Behavioral intent-Positive		*Behavioral intent-Positive*	
A lot less hard	5.8%	--	
Somewhat less hard	4.3%	A lot less hard v. somewhat less hard	5.0%
A little less hard	4.1%	Somewhat less hard v. little less hard	4.2%
No differently	7.3%	A little less hard v. no differently	5.7%
A little harder	9.5%	No differently v. a little harder	8.4%
Somewhat harder	13.0%	A little harder v. somewhat harder	11.0%
A lot harder	n/a [b]		n/a
Behavioral intent-Negative		*Behavioral intent-Negative*	
A lot less hard	-2.0%	--	
Somewhat less hard	-2.9%	A lot less hard v. somewhat less hard	-2.45%
A little less hard	-4.4%	Somewhat less hard v. little less hard	-3.65%
No differently	-6.5%	A little less hard v. no differently	-5.65%
A little harder	-8.0%[a]	No differently v. a little harder	-7.25%
Somewhat harder	n/a		n/a
A lot harder			

Notes: [a]Results are based on small Ns; [b]n/a = Category values and category thresholds could not be estimated due to single responses.

TABLE 3
Category Values and Category Thresholds in the Field Study – Affective Reactions

Category Labels	Event Affect						Attribution Affect	
	Positive Affect			Negative Affect			Positive Affect	Negative Affect
	Excited	Proud	Determined	Nervous	Guilty	Afraid	Strong	Hostile
	Category Values							
Never	6.29%	6.33%	5.38%	-5.64%	-4.36%	-5.64%	5.60%	-4.00%
Seldom	8.45%	8.86%	8.50%	-4.70%	-2.00%	-2.75%	6.33%	-8.00%
Once in a while	4.63%	8.30%	8.00%	-8.75%	-5.00%	-3.50%	8.90%	-6.50%
Occasionally	7.83%	5.00%	6.50%	-4.25%	n/a	-4.50%	9.80%	-8.00%
Often	6.50%	n/a	10.50%	-3.50%	n/a	-4.25%	9.50%	-5.56%
With each passing day	11.75%	n/a	9.13%	n/a	n/a	n/a	n/a	n/a
All the time	n/a [b]	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Category Thresholds							
Seldom v. Never	7.37%	7.59%	6.94%	-5.17%	-3.18%	-4.20%	5.97%	-6.00%
Once in a while v. Seldom	6.54%	8.58%	8.25%	-6.73%	-3.50%	-3.13%	7.62%	-7.25%
Occasionally v. Once in a while	6.23%	6.65%	7.25%	-6.50%	n/a	-4.00%	9.35%	-7.25%
Often v. Occasionally	7.17%	n/a	8.50%	-3.88%	n/a	-4.38%	9.65%	-6.78%
With each passing day v. Often	9.13%	n/a	9.81%	n/a	n/a	n/a	n/a	n/a
All the time v. With each passing day	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Notes: [a]Results are based on small Ns; [b]n/a = Category values and category thresholds could not be estimated due to single responses.