SMALLEST MEANINGFUL PAY INCREASES: FIELD TEST, CONSTRUCTIVE REPLICATION, AND EXTENSION

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The authors extend prior literature by examining, in two distinct field settings, smallest meaningful pay increases *(SMPIs) in terms of magnitude, behavioral intention, and affective reactions. In Study 1, a two-wave study of 177 employees of a university medical center in the United States, the authors find stable thresholds of about 5.0 percent for positive reactions to pay increases (magnitude [5.4 percent], behavioral intentions [4.2 percent], and affective reactions [5.6 percent]). In Study 2, a sample of 495 university employees in Finland, the authors also find stable but slightly higher thresholds of about 8 percent for behavioral intentions (8.4 percent) and positive affective reactions (7.2 percent) to pay increases. They also find threshold effects of –5.7 percent for behavioral intentions and –5.8 percent for negative affective reactions in response to restricted future pay increases levied in the transition to a new pay system. Discussion of the results centers on pay raise administration and future research regarding implied and direct pay reductions. © 2015 Wiley Periodicals, Inc.*

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Organizational decision makers venerate the use of merit pay plans, designed and commonly used to motivate high performance, retain high performers, and signal a performance-based culture (Gerhart & Rynes, 2003; Gupta & Shaw, 2014; Heneman, 1992). Nevertheless, merit pay increases apparently have a positive but modest relationship to employee outcomes such as performance and satisfaction (Heneman, 1992; Nyberg, Pieper, & Trevor, 2013). Meta-analyses have confirmed that financial incentives generally relate positively but moderately to performance quantity (Jenkins, Mitra, Gupta, & Shaw, 1998), and relate rather weakly to other outcomes such as satisfaction and positive affect (e.g., Williams, McDaniel, & Nguyen, 2006), possibly because typical merit pay increases are too small for employees to see them as meaningful. Administrators of merit pay systems face a central challenge: merit pools are often meager, so salaries of key contributors cannot be raised enough to establish meaningful differentials between employees (Campbell, Campbell, & Chia, 1998). In the United States, *high* performers received only about 4.8 percent average performance-based pay raises during generally good economic times in the mid-1990s (Hansen, 2006) and markedly less after the recent financial crises (e.g., Giancola, 2009).

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Recent threshold-based reasoning suggests that small pay raises basically just go unnoticed; employees do not assign psychological meaning to meager sums. Psychophysical theories, applied to pay raise thresholds, assert that if pay raises fail to be psychologically meaningful, they will not evoke reactions. The point at which individuals begin to react to merit pay raises is called the *just noticeable difference* threshold or *smallest meaningful pay increase* (SMPI) (Mitra, Gupta, & Jenkins, 1997). SMPI conceptualizations are based on the study of thresholds for other sensory-related stimuli such as the brightness of light or the loudness of sound (see Gescheider, 1976). The meager literature on SMPI suggests that the threshold may be as high as 7 percent of base pay (see Katkowski, Medsker, & Pritchard, 2002, for a review). As noted earlier, typical merit increases, even for top performers, fall far below the 7 percent threshold.

Although informative, the literature on pay raise thresholds leaves many unresolved concerns. Although consensus is growing regarding threshold levels, the literature remains generally rather sparse. Research can also be criticized on external validity grounds. For example, the most rigorously designed study of pay raise thresholds (Mitra, Gupta, & Jenkins, 1995; Mitra et al., 1997) involved students "working" at coding simple data sheets for a short time in a laboratory setting. Other studies are similarly susceptible to external validity threats for using nettlesome methods such as having individuals respond to multiple "hypothetical" pay raises, for assessing situations in which pay raises have restricted variations, and for relying solely on US samples (e.g., Champlin & Kopelman, 1991; Futrell & Varadarajan, 1985; Hinrichs, 1969). Our first intended contribution is to extend the SMPI literature by testing and attempting to replicate findings in field settings in the United States (Study 1) and Finland (Study 2).

Recent threshold-based reasoning suggests that small pay raises basically just go unnoticed; employees do not assign psychological meaning to meager sums.

Second, the SMPI literature has focused on pay increases and ignored the negative effects that may result when organizations freeze employee pay for extended periods. Once rare, pay cuts, pay freezes, and furloughs have become common; firms worldwide frequently opt not for layoffs but for strategies that ebb increasing payroll costs (Dade & Tuna, 2008; Luan, Tien, & Chi, 2013). In addition, the growing popularity of pay-at-risk programs (e.g., Begley & Lee, 2005; Messersmith, Guthrie, Ji, & Lee, 2011) raises concerns about employee perceptions of pay reductions, both real and implied by inflation rates and restrictions on future pay increases. Our second contribution, in Study 2, is to estimate thresholds for reactions to restrictions on pay increases after universities changed their pay systems.

A Psychophysics Theory View of Pay Increases

SMPI has been conceptualized and operationalized using Weber's law, first enunciated by the nineteenth-century German scientist Ernst Weber (Champlin & Kopelman, 1991; Gescheider, 1976). Weber's law explains that "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). When applied to stimulus intensities such as the brightness of light, Weber's law asserts that individuals notice a change in brightness at a stable threshold of current stimulus intensity. Below the threshold, they will be unaware of changes as the light increases; above the threshold, they will recognize that the light is becoming brighter. Researchers interested in merit pay have applied Weber's law to the study of pay changes. When applied to merit pay raises, Weber's law would indicate that the pay threshold is a constant fraction of the starting pay level. The analogy to pay increases is that pay differences below an SMPI threshold will not evoke positive or negative reactions, but instead will be meaningless in terms of evoking behavioral intentions or affective reactions.

An unnoticeable change in light or sound intensity differs, of course, from a meaningless pay change. Clearly, those who wish to evaluate absolute differences can observe even a trivial merit pay increase on a pay statement. But Weber's law can be reasonably approximated in terms of whether the pay change evokes meaningful response or goes unnoticed in terms of behavioral intentions and affective reactions. Above the threshold, employees will sense and react to changes in the stimulus intensity—that is, they will react positively to pay increases. At an operational level, we may obtain estimates of SMPI thresholds by examining the point at which individuals change the labels they give to different stimulus intensities. In the case of lighting intensity, the SMPI threshold is analogous to the point at which individuals change their evaluation of brightness from "*no change*" to "*slightly brighter*." In the case of pay changes, the SMPI threshold may be estimated at the point, for example, where individuals report that the new pay level has caused them to change their behavioral intentions from "*no change*" to "*work a little harder*."

Pay Increases and Thresholds

The literature has provided substantial support to apply Weber's law for understanding employees' perceptions about pay increases. An experimental study of student workers indicated that a stable threshold of about 7 percent of prior base-pay level was necessary for a merit raise to impact behavioral intentions to work harder and affective reactions such as happiness (Mitra et al., 1997). Although beset by several method-related limitations, psychophysics investigations of pay thresholds have also demonstrated threshold values of similar percentages (e.g., Champlin & Kopelman, 1991; Futrell & Varadarajan, 1985; Hinrichs, 1969; Rambo & Pinto, 1989; Worley, Bowen, & Lawler, 1992). Thus, we predict that SMPI has a threshold that is, on average, a constant fraction of base pay.

Hypothesis 1: A threshold at a constant fraction of current pay levels will be necessary for a smallest meaningful pay increase to impact magnitude, behavioral intentions, and affective reactions.

Study 1 Method

Participants, employees of a university hospital in the United States, completed questionnaires four months prior to and four months following the administration of merit pay increases. At Time 1, 432 employees completed questionnaires during their lunch break. At Time 2, four months after merit increases were awarded, 464 employees completed another questionnaire during their lunch hour. Of these, 177 participated at Time 1. Their job titles encompassed major hospital categories such as nurse, physician, laboratory tech, administrator, staff associate, and housekeeper. The average age (37.40 years) and gender proportion (77 percent female) in our analysis sample were similar to the average profiles (38–39 years; 79 percent female) provided by the hospital. The distribution of job titles in the sample (the percentage of respondents in each category) was very similar across the five categories to the actual percentages provided by the hospital.

Annual salary information at the university was available publicly for 161 of the 177 two-wave participants because 16 resident physicians were coded as students rather than as employees. Merit increases ranged from 0 percent to 25 percent, for an average pay raise of 5 percent. The data used in this study were gathered as a part of a large-scale investigation (Duffy, Scott, Shaw, Tepper, & Aquino, 2012; Schaubroeck, Shaw, Duffy, & Mitra, 2008; Shaw, Duffy, Mitra, Lockhart, & Bowler, 2003).

Measures

Magnitude

Using Mitra and colleagues' (1997) magnitude measure, we asked participants, "What do you think about the change in your pay between the last year and this year?" Perceptions of the magnitude of changes in pay were measured using seven category labels: 1 = *no change in pay,* 2 = *tiny change,* 3 = *small change,* 4 = *modest change,* 5 = *considerable change,* 6 = *substantial change,* and 7 = *enormous change*.

Behavioral Intentions

Using Mitra and colleagues' (1997) behavioral intention measure, we asked participants, "What effect will the change in your pay between last year and this year have?" The item had seven response options: 1 = *I will work a lot less hard than before,* 2 = *I will work somewhat less hard than before,* 3 = *I will work a little less hard than before,* 4 = *It will not make me work any differently than before,* 5 = *I will work a little harder than before,* 6 = *I will work somewhat harder than before,* and 7 = *I will work a lot harder than before*.

Affective Reactions

Using the affective reactions measure from Mitra et al. (1997), we asked, "How do you feel about the change in your pay between last year and this year?" The item had five response options: 1 = *crushed*, 2 = *disappointed*, 3 = *indifferent*, 4 = *pleased*, and 5 = *ecstatic*.

Estimates of SMPI Thresholds

We calculated SMPI estimates for magnitude, behavioral intentions, and affective reactions following procedures used previously by Mitra et al. (1997) and Rambo and Pinto (1989), who also recommended using Guilford's (1954) general principle of successive-categories scaling to determine a single scale value (in this case, new pay level) for each category label. They argued that the best estimate of a category value is the midpoint of the cumulative frequency distribution of stimuli evoking the judgment. We used the calculation procedure from Mitra et al. (1997, pp. 127–128). Because the distributions were truncated, we used medians in these calculations, following Guilford's (1954) suggestions and Mitra and colleagues' (1997) empirical work. Guilford's straightforward approach for calculating thresholds suggested first calculating category values as the median of the judgment distribution of a category. The formula for the interpolated median is:

$$C = R_l + \frac{(R_h - R_l)(0.5 - p_l)}{(p_h - p_l)} \quad (1)$$

where

C = Interpolated median (category value)
R_l = Raise level immediately lower than the midpoint of the cumulative distribution
R_h = Raise level containing the midpoint of the cumulative distribution
p_l = Cumulative proportion of judgments for the stimulus immediately lower than the midpoint
p_h = Cumulative proportion of judgments for the stimulus containing the midpoint

To calculate category values, we used frequency distribution of employees' responses based on a range of pay increases as shown in Table I. As shown in Table II, the affect dimension comprised five category labels (e.g., crushed, disappointed, indifferent, pleased, and ecstatic). The SMPI category thresholds are estimated as the average of the median values for two successive categories. Accordingly, five category values for the affect dimension were used to estimate four category-based thresholds. In this sample, employees reported that they were "indifferent" to a pay raise of 4.5 percent. When employees received an average raise of 6.8 percent, they tended to use the category label "pleased" to summarize their affective reactions. Based on the operational definition stated earlier, the category threshold between the two category labels "indifferent" and "pleased" can be calculated by taking the average of 4.5 percent and 6.8 percent (i.e., 5.6 percent or the midpoint between the two category labels). This estimated midpoint value implies that merit pay raises above 5.6 percent cause employees to feel "pleased." However, employees feel "indifferent" to raises below 5.6 percent.

In short, we estimated four category-based thresholds using the average of the midpoints between the five category values for the affect dimension. Which, however, of the four category-based affective threshold values should we consider as the *key* or *critical SMPI?* Mitra et al. (1997) suggested that the *key or critical SMPI* is one that changes the nature of affective reactions experienced by an employee. That is, in the case

TABLE I Study 1: Frequency Distributions of Category Judgments for Pay Increases

	Pay Increase (%)							
Category Label	**0–3%**	**4–6%**	**7–9%**	**10–12%**	**13–15%**	**16–18%**	**19–21%**	**> 21%**
Magnitude								
No change	2	9	0	0	0	0	0	0
Tiny change	7	33	1	1	1	0	0	0
Small change	4	32	2	0	0	0	0	1
Modest change	1	16	1	0	0	0	0	0
Considerable change	2	6	1	0	0	0	0	0
Substantial change	0	1	0	0	0	0	0	1
Enormous change	0	1	0	0	0	0	0	1
Affect								
Crushed	0	3	0	0	0	0	0	0
Disappointed	9	43	1	0	1	0	0	0
Indifferent	3	20	1	1	0	0	0	0
Pleased	4	32	3	0	0	0	0	3
Ecstatic	0	0	0	0	0	0	0	0
Behavioral Intentions								
No change	3	14	0	1	0	0	0	0
A lot less hard	0	0	0	0	0	0	0	0
Somewhat less hard	1	0	0	0	0	0	0	0
A little less hard	0	2	0	0	0	0	0	0
No differently	9	69	4	0	0	0	0	1
A little harder	0	5	1	0	0	0	0	0
Somewhat harder	3	4	1	0	0	0	0	1
A lot harder	0	2	0	0	0	0	0	1

TABLE II Study 1: Category Values and Category Thresholds for Pay Increases

Category Dimension/ Category Label	Category Value (%)	Category Dimension/Category Thresholds Type	Threshold Value (%)
Magnitude		*Magnitude*	
No change	3.7	—	
Tiny change	4.0	Tiny versus no change	3.8
Small change	5.4	Small versus tiny change	4.7
Modest change	5.4	**Modest versus small change**	**5.4**
Considerable change	5.9[a]	Considerable versus modest change	5.6
Substantial change	n/a[b]	Substantial versus considerable change	—
Enormous change	—	Enormous versus substantial change	—
Affect		*Affect*	
Crushed	3.3	—	
Disappointed	4.2	Disappointed versus crushed	3.7
Indifferent	4.5	Indifferent versus disappointed	4.3
Pleased	6.8	**Pleased versus indifferent**	**5.6**
Ecstatic	—	Ecstatic versus pleased	—
Behavioral Intentions		*Behavioral Intentions*	
A lot less hard	n/a	—	
Somewhat less hard	n/a	A lot less hard versus somewhat less hard	n/a
A little less hard	n/a	Somewhat less hard versus little less hard	n/a
No differently	3.4	A little less hard versus no differently	n/a
A little harder	5.0	**No differently versus a little harder**	**4.2**
Somewhat harder	5.0	A little harder versus somewhat harder	5.0
A lot harder	n/a	Somewhat harder versus a lot harder	n/a

Notes: SMPI thresholds are noted in bold in the table. The category values were calculated using the formula given in formula 1 and based on the frequency of responses given in Table I.

[a] Results are based on small *N*s.

[b] n/a = Category values and category thresholds could not be estimated.

of the affective dimension, the key or critical SMPI should be the midpoint between category labels that imply shift from "no emotions" (i.e., category label "indifferent") to "positive emotions" (i.e., category label "pleased"). To summarize, the logic of SMPIs suggests that the *key* or critical threshold is the point at which the pay change is *just meaningful enough to cause employees to deploy a new cognitive label that implies a shift in the direction of behaviors or emotions*. For the magnitude dimension, this threshold would be the point at which a pay increase causes an employee to switch the category label from *small* change to *modest* change. For behavioral intentions, this threshold would be the point at which a pay increase changes reactions from *work no differently* to *work a little harder*. For affective reactions, the key threshold would be the point at which pay increases trigger a change from *indifferent* to *pleased*. These key thresholds, the SMPIs, are denoted in bold in Table II and have estimated values of 5.4 percent for the magnitude dimension, 5.6 percent for the affect dimension, and 4.2 percent for the behavioral intentions dimension.

In addition to calculating threshold values, the logic of SMPIs in pay changes also requires empirical support for 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). First, using pay increases as an example, this approach indicates that 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 percentages of old pay levels, the relationship between pay raises and category ratings should show *parallel* lines across pay levels. Base pay levels and category ratings should not interact in predicting the size of the pay raise viewed as a percentage of base pay.

Second, a different pattern of results should surface when pay raises are viewed as absolute pay change amounts: an interaction, or a *fan* effect, should be evident. Anderson's approach suggests an interaction effect when pay changes are viewed as absolute dollars/euros and no interaction effect when viewed as proportions, which provides statistical support for the constancy of Weber's fraction. Thus, we conducted analyses using general linear models to examine the parallel (pay changes as percentages) and fan effect (pay changes as absolute amounts) propositions for the dimensions of interest (magnitude, behavioral intentions, and affective reactions).

To test the stability of Weber's law, we also used Champlin and Kopelman's (1991) statistical analysis method suggesting that a generalized function for Weber's law can be stated:

$$\text{SMPI} = k \bullet \text{Old Pay}^{b} \quad (2)$$

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

$$ln(\text{SMPI}) = ln(k) + b \bullet ln(\text{Old Pay}) \quad (3)$$

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., $b = 1$).

Keying responses to actual raises ensured that subjects responded to actual rather than hypothetical stimuli. Furthermore, participants in the study compared old and new pay levels, and thus the data reflected discrimination judgments necessary for the proper operationalization of Weber's law.

From a psychological point of view, individuals do not react to negative events and interactions symmetrically; negative events carry more evaluative impact and create more cognitive rumination—a process known as mobilization.

Study 1 Results

Table I shows participants' distribution of judgments regarding the magnitude, behavioral intentions and affective reactions. We used range of changes in pay to generate the judgments. Moreover, because the judgments were truncated, we followed Mitra et al. (1997) and calculated interpolated medians using Guilford's (1954) method. Table II shows the estimates of category values and the pay thresholds for the three variables.

The SMPI thresholds for magnitude, behavioral intentions, and affective reactions are 5.4 percent, 4.2 percent, and 5.6 percent, respectively. We tested the stability of Weber's fraction by using Anderson's functional measurement approach (Anderson, 1982; Mitra et al., 1997) and the method suggested by Champlin and Kopelman (1991). The results indicate that when pay raises are treated as absolute dollars, both dimensions have significant interaction effects ($p < .05$), but when pay raises are treated as percentages, the interaction between old pay and the category value is not significant. Multiple regression analysis indicated that b was significantly different from zero for all dimensions, but confidence interval data suggested that it was not significantly different from 1. Taken together, the results further buttress the application of Weber's law to changes in pay levels and support the constancy of the fraction.

Study 2 Extensions

Study 1 provided results consistent with the notion of minimum threshold effects for affective reactions and behavioral intentions to work harder. For these dimensions, the SMPI thresholds were about 5 percent of base pay. Although informative, the findings could be criticized for being sample specific and being conducted in a stable setting with a limited range of pay increases, among other threats to external validity. In Study 2, we aimed to replicate the SMPI findings of Study 1 for behavioral intentions and affective reactions in a markedly different sample, with different historical compensation norms and practices, and in a setting with a wider distribution of merit pay increases.

Our exploratory analyses also examined whether restrictions on pay increases as part of a pay system change had a minimum threshold. Although researchers have progressed in terms of estimating pay thresholds for pay increases, no research to our knowledge has examined thresholds for lost prospects for future pay raises. Possibly minimum negative thresholds will be smaller than thresholds for positive increases. Prospect theorists, for example, have argued that losses loom larger than gains, a phenomenon known as *loss aversion* (Kahneman & Tversky, 1979, 1984). Because the utility function is steeper for losses than for gains, prospect theory suggests that a $100 loss will be more dissatisfying than a $100 gain will be satisfying. From a psychological point of view, individuals do not react to negative events and interactions symmetrically; negative events carry more evaluative impact and create more cognitive rumination—a process known as *mobilization* (Duffy, Ganster, & Pagon, 2002; Taylor, 1991). Heightened reactions to negative events occur partly because (1) they evoke stronger physiological responses, (2) they focus attention on dealing

with immediate dangers/toxicities, (3) they are rarer and are frequently unexpected, and (4) they involve more cognitive effort (Duffy et al., 2002; Taylor, 1991). To summarize, "… negative events appear to mobilize physiological, affective, cognitive, and certain types of social resources to a greater degree …" (Taylor, 1991, p. 72).

In Study 2, the participating universities had recently transitioned from a seniority-based to a merit-based pay system. In the process, the university reevaluated the content and baseline value of all university jobs and, in some cases, assigned significantly lower pay levels to some job titles. Labor negotiations, however, resulted in an arrangement where these lower pay levels would be supplemented with guaranteed pay to allow employees to maintain their previous overall pay levels as long as they held their same positions. Thus, for employees who received lower base-salary levels supplemented by guaranteed pay, the new pay system restricted pay increases and dimmed their prospects for future pay increases. Future merit-based pay allocation would reduce only the amount of the pay guarantee but not actually increase total pay until the pay guarantee was eliminated. Thus, following the threshold-based line of reasoning, we predicted that employees would react to the pay increase restriction according to a constant fraction of base-pay level.

Hypothesis 2: A threshold at a constant fraction of current pay levels will be necessary for restricted future pay increases to negatively impact employees' behavioral intentions and affective reactions.

Study 2 Method

We collected data shortly after two Finnish universities had transitioned from a seniority- to a merit-based pay system. After local collective bargaining, university officials and powerful Finnish labor unions reached an agreement that included two key features that are especially important for this study. First, during the transition to merit pay, a budget of 7.24 percent of total payroll costs was available for pay increases based on appraisal of competencies required at the job as well as performance. Pay increases were paid out gradually during a transition period. Before we administered questionnaires, 68 percent of the employees in the sample had received a merit-based pay increase. Under the new system, 24 percent had received guaranteed pay (i.e., the future pay increase restriction). These data were collected as part of a larger study of reactions to pay changes (Tenhiälä & Lount, 2013).

Sample

We collected data from employees and pay data from university records of the two universities. We used personnel records to draw a random sample of 1,000 academic and administrative personnel. We sent a web-based questionnaire to each prospective participant via e-mail using a double-blind procedure. All measures were administered in Finnish, the native language of the respondents, after being translated from and back-translated to English. A third party unaffiliated with the research team matched names to randomly assigned unique identifiers. The members of the research team and the employer representatives who provided records-based pay data for the entire sample were unaware of the identities of those completing the questionnaires. In all, we obtained 495 completed questionnaires—248 from one university (response rate = 50 percent) and 247 from the other (response rate = 49 percent). The gender proportion in the analysis sample (36 percent and 55 percent women, respectively) was similar to the data provided by the universities (33 percent and 52 percent women, respectively). The first university sample had a proportion of academic versus administrative personnel that matched the proportion in the university as a whole (64 percent), although the second university sample included a somewhat larger proportion of academic personnel than administrative personnel (75 percent academic personnel in the sample versus 49 percent in the university). Further, we compared the pay levels and proportions of employees (academic and administrative separately) receiving a future pay increase restriction at both universities. These checks suggest that the analysis sample was reasonably representative of the population of employees in these universities.

Measures

Behavioral Intentions

Using Mitra and colleagues' (1997) behavioral intent measure, we asked participants, "What effect will the change in your pay between last year and this year have?" The item had seven response options: 1 = *I will work a lot less hard than before,* 2 = *I will work somewhat less hard than before,* 3 = *I will work a little less hard than before,* 4 = *It will not make me work any differently than before,* 5 = *I will work a little harder than before,* 6 = *I will work somewhat harder than before,* and 7 = *I will work a lot harder than before*.

Affective Reactions

We used the markers of positive and negative affect from the Positive and Negative Affect

Schedule (PANAS) (Watson, Clark, & Tellegen, 1988) to assess affective reactions. Participants were asked how often the pay system change had caused them to experience positive and negative affective responses. The items had six response options from 1 = *never* to 6 = *all the time*. The respondents rated their experienced frequency of discrete negative emotions (e.g., nervous, afraid, and hostile) and discrete positive emotions (e.g., excited, strong, and inspired) "during the pay system change," as employees were informed about their specific pay changes at different points of time. The key threshold for positive and negative affect based on PANAS scale would be the point at which a change in pay level triggers change in category label employed by workers from *seldom* to *once in a while*. The Cronbach's alpha is .85 for positive affective reactions (8 items[1]) and .91 for negative affective reactions (10 items).

Study 2 Results

Table III shows participants' distribution of judgments regarding the behavioral intention dimension for pay increases and future pay increase restriction. Table IV shows the estimates of category values and the SMPI thresholds for behavioral intentions. The estimated SMPI for behavioral intentions for pay increases is 8.4 percent. Similar to positive pay changes, category-based threshold for future pay increase restriction should correspond to a shift in category labels from *work no differently* to *work a little less hard*. The future pay increase restriction threshold for behavioral intent was –5.7 percent (Table IV).

The results of SMPI estimates and future pay increase restriction thresholds for affective reactions, using positive and negative affect markers, are provided in Table V. As indicated earlier, the key threshold for affective reactions would be the point at which pay increases (or future pay increase restrictions) would correspond to category label transitions from category label *seldom* to *once in a while*. For pay increases, the threshold estimate is 7.2 percent. For future pay increase restrictions, the threshold estimate is –5.8 percent.

As in Study 1, we tested the stability of Weber's fraction by using Anderson's functional measurement approach (Anderson, 1982; Mitra et al., 1997) and the method suggested by Champlin and Kopelman (1991). The results indicated that when pay changes were treated as absolute euros, the interaction effects for the behavioral intention dimension were significant for positive increases ($p < .05$) and for future pay increase restriction ($p < .01$). When pay raises were treated as percentages, the interactions between old pay

TABLE III **Study 2: Frequency Distributions of Category Judgments for Pay Increase and Future Pay Increase Restriction (Behavioral Intentions)**

	Pay Increase (Example: Behavioral Intentions)							
Category Label	**0–3%**	**4–6%**	**7–9%**	**10–12%**	**13–15%**	**16–18%**	**19–21%**	**> 21%**
The pay 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

	Future Pay Increase Restriction (Example: Behavioral Intentions)					
Category Label	**0–3%**	**4–6%**	**7–9%**	**10–12%**	**13–15%**	**> 15%**
The pay 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
Somewhat harder	0	0	0	0	0	0
A lot harder	0	0	0	0	0	0

TABLE IV **Study 2: Category Values and Category Thresholds for Pay Increases and Future Pay Increase Restriction—Behavioral Intention Dimension**

Category Dimension/Category Label	Category Value (%)	Category Dimension/Category Thresholds Type	Threshold Value (%)
Behavioral Intention—Pay Increase		*Behavioral Intention—Pay Increase*	
A lot less hard	5.8	—	
Somewhat less hard	4.3	A lot less hard versus somewhat less hard	5.0
A little less hard	4.1	Somewhat less hard versus little less hard	4.2
No differently	7.3	A little less hard versus no differently	5.7
A little harder	9.5	**No differently versus a little harder**	**8.4**
Somewhat harder	13.0	A little harder versus somewhat harder	11.0
A lot harder	n/a[a]	Somewhat harder versus a lot harder	n/a
Behavioral Intent—Future Pay Increase Restriction		*Behavioral Intent—Future Pay Increase Restriction*	
A lot less hard	–2.0	—	
Somewhat less hard	–2.9	A lot less hard versus somewhat less hard	–2.5
A little less hard	–4.4	Somewhat less hard versus little less hard	–3.7
No differently	–6.5	**A little less hard versus no differently**	**–5.7**
A little harder	–8.0	No differently versus a little harder	–7.3
Somewhat harder	n/a	A little harder versus somewhat harder	n/a
A lot harder	n/a	Somewhat harder versus a lot harder	n/a

Notes: SMPI thresholds are noted in bold in the table. The category values were calculated using the formula given in formula 1 and based on the frequency of responses given in Table III.
[a]n/a = Category values and category thresholds could not be estimated.

TABLE V **Study 2: Category Values and Category Thresholds for Positive and Negative Affect**

Category Dimension/Category Label	Category Value (%)	Category Dimension/Category thresholds Type	Threshold Value (%)
PA Scale—Pay Increase		*PA Scale—Pay Increase*	
Never	4.2	—	
Seldom	6.8	Seldom versus never	5.5
Once in a while	7.7	**Once in a while versus seldom**	**7.2**
Occasionally	6.7	Occasionally versus once in a while	7.2
Often	12.5	Often versus occasionally	9.6
With each passing day	11.8	With each passing day versus often	12.1
All the time	n/a[a]	All the time versus with each passing day	—
NA Scale—Future Pay Increase Restriction		*NA Scale—Future Pay Increase Restriction*	
Never	–8.0	—	
Seldom	–3.5	Seldom versus never	–5.8
Once in a while	–8.0	**Once in a while versus seldom**	**–5.8**
Occasionally	–4.0	Occasionally versus once in a while	–6.0
Often	–6.0	Often versus occasionally	–5.0
With each passing day	n/a	With each passing day versus often	—
All the time	n/a	All the time versus with each passing day	—

Notes: SMPI thresholds are noted in bold in the table. The category values were calculated using the formula given in formula 1.
[a]n/a = Category values and category thresholds could not be estimated.

and category values for pay increases as well as future pay increase restriction 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, those results further buttressed the application of Weber's law to changes in pay levels and supported the constancy of the fraction for both pay increases and future pay increase restriction. Thus, we found support for Hypothesis 2 for the stability of Weber's fraction for the perceptions of the size of restricted future pay increases in terms of behavioral intentions and negative affective reactions.

Discussion

The psychology of reactions to pay changes continues to fascinate and perplex organizational researchers. We contribute to this literature by using psychophysics theory to examine SMPI thresholds for pay increases across behavioral intentions and affective reactions in two field studies, as well as magnitude in Study 1. We find that pay thresholds for *pay increases* are evident at about 5 percent (range from 4.2 percent to 5.6 percent) of prior base-pay levels in terms of behavioral intentions and affective reactions in Study 1—a two-wave field study of hospital employees in the United States—and slightly higher thresholds at about 8 percent (range from 7.2 percent to 8.4 percent) in Study 2—a two-wave study of university employees in Finland. In addition to replicating and extending findings on SMPIs, we also estimate threshold effects for future pay increase restrictions in Study 2. These threshold are –5.7 percent for behavioral intentions and –5.8 percent for negative affective reactions. The results, *in toto*, suggest considerable stability in terms of individuals' reactions to positive pay changes and pay increase restrictions in different contexts.

In addition to replicating and extending findings on SMPIs, we also estimate threshold effects for future pay increase restrictions in Study 2.

The results of this study have clear practical implications. As noted, even for top performers (Hansen, 2006), average merit pay increases tend to be well below the thresholds estimated here and in other empirical studies. These findings suggest that compensation decision makers should consider rewarding top performers with increases beyond a minimum level (e.g., at least 5 percent) to generate positive behavioral and affective responses. If threshold-based reasoning is correct, widening the distribution in light of the SMPI thresholds should not exacerbate negative responses to pay increases, but should instead increase average satisfaction and effort levels—employees will continue to be ambivalent about raises below threshold levels and more positive about raises above threshold levels. In light of SMPI findings, authors have advocated various suggestions: distribute only cost-of-living adjustments when merit budgets are small (e.g., Mitra et al., 1995), distribute raises based on other legitimate criteria, such as seniority, to reward and retain at least average performers (e.g., Shaw & Gupta, 2007), or emphasize other meanings of performance-based pay including feedback, control, and relative standing (e.g., Thierry, 2001).

The SMPI thresholds that we report using the successive categories approach, while perhaps higher than conventional wisdom would suggest, are more conservative than participants' direct estimates of meaningful raises. We also included direct assessments of SMPIs in our questionnaires by asking participants to report the minimum pay increase that they would cause a positive behavioral intention and also the minimum pay increase that they would find *pleasing*. In general, this method yields *higher* estimates of minimum SMPI thresholds. Among hospital employees in the United States, participants on average reported that merit raises would need to be at least 10 percent to be pleasing and 12 percent to result in higher effort intentions in the coming year. In Study 2, university employees in Finland, participants reported that merit raises would need to be at least 14 percent in order to be pleasing and 12 percent to evoke a positive behavioral intention. Thus, although the successive categories estimates may appear large, they are substantially smaller than direct participant reports about the size of meaningful increases. It would be interesting for future researchers to explore the antecedents of these differences as well as to conduct studies to explain why individuals tend to *underestimate* the importance of pay in decision making (Rynes, Gerhart, & Minnette, 2004), but *overestimate* the amount of pay that will change behavior or affect (Heath, 1999).

Based on our study, we offer several suggestions for future research. First, with growing emphasis on pay-at-risk and variable pay (Milkovich, Newman, & Gerhart, 2011), future research should consider the meaning of pay increase restrictions in comparison with *direct* pay reductions. Our results suggest that employees react dramatically and sensitively to restrictions on future merit increases; they have low thresholds for restrictions that diminish prospects for

future pay increases. Thus, future studies should compare our results with actual pay reduction situations. It is reasonable to speculate that individuals would be more sensitive to actual pay reductions, and therefore the thresholds for pay reductions may be even smaller than those for restrictions on pay growth reported here. Second, researchers have shown that prior expectations and confidence in the veracity of the pay system play a role in how individuals interpret their pay raises (Schaubroeck et al., 2008) and personality differences play a role as well (Shaw et al., 2003; Shaw, Duffy, Jenkins, & Gupta, 1999). Future researchers might explore how these issues in light of stable SMPI estimates. Third, results of our two field studies provide modestly different, though stable, SMPI estimates positive changes in pay. Logically, data related to contextual factors, such as cross-cultural and economic factors, should be collected in future investigations to understand possible national or cultural differences in perceptions of pay changes. Fourth, researchers should carefully assess the psychometric properties of different methods of estimating pay thresholds. Fifth, including the results of the two studies reported here, there is sufficient evidence to support SMPI logic for merit pay systems. However, future investigations should also seek to estimate SMPI based on actual, rather than hypothetical, changes in other forms of variable pay (Worley et al., 1992, found a 5 percent SMPI for "hypothetical" bonuses).

Although our research offers many new insights into the applicability of psychophysical theories to changes in pay, it also suffers from several weaknesses. First, our field study lacks the control desired for testing Weber's law (Mitra et al., 1997). As Table I shows, each category has response variations across different pay raises. That is, each respondent assigned a different category of meaning to the size of the pay raise. A secondary analysis suggested that typical control variables such as annual pay level or gender were not significantly correlated with merit pay raises in either study. Furthermore, in Study 2, we did not find a significant correlation between direct estimates of SMPI and various control variables. Second, our analyses for negative reactions included only future loss of increased pay. Thus, the discrimination judgments that underlie a validation of Weber's law may be specified inadequately when it comes to estimates of pay thresholds for pay reductions. In sum, we encourage future researchers to estimate SMPIs for positive and negative pay changes across additional affective responses and to extend the psychophysics framework to pay change situations in other cultures and contexts.

Conclusions

In this article, we estimate smallest meaningful thresholds for pay increases and future pay increase restriction. We find stable SMPI thresholds at about 5 percent (range from 4.2 percent to 5.6 percent) of base pay in a study of hospital employees in the United States and about 8 percent (range from 7.2 percent to 8.4 percent) in a field study of university employees in Finland. In general, these estimates are in line with threshold effects obtained in laboratory studies using the same method (about 7 percent; Mitra et al., 1997). Our second study also revealed a threshold of about –5.7 percent for future pay increase restrictions. We hope that our findings and discussion will lead to interesting and important future research regarding pay thresholds within different contexts, such as when employees experience direct pay cuts and losses in future prospects for pay increases.

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Note

1. The original 10-item scale was converted into an 8-item scale because when translated into Finnish, two items of the original scale had identical meanings to two other items.

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