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Perfectionism and Task Performance:

Time on Task Mediates the Perfectionistic Strivings–Performance Relationship

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Abstract

Numerous studies have demonstrated that perfectionistic strivings are associated with higher performance. Few studies, however, have investigated *how* perfectionistic strivings lead to higher performance. The present study investigated whether invested time (time on task) can explain the relationship between perfectionistic strivings and task performance. A sample of 100 university students performed a simple letter-detection task. Afterwards they rated their subjective effort regarding speed and accuracy. Results showed that (a) perfectionistic strivings showed positive correlations with time on task and with task performance and (b) that time on task fully mediated the relationship between perfectionistic strivings and task performance. Regarding subjective effort, students high in perfectionistic strivings indicated that they put more effort in accuracy than in speed compared to students low in perfectionistic strivings. The findings indicate that invested time may explain how perfectionistic strivings lead to higher performance in simple self-paced tasks. Moreover, they indicate that, for people high in perfectionistic strivings, accuracy of task performance is more important than speed.

Keywords: perfectionism; achievement; performance; time on task; errors; effort; speed; accuracy

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Introduction

Perfectionism is a personality disposition characterized by striving for flawlessness and setting excessively high standards for performance accompanied by tendencies for overly critical evaluations of one's behaviour (Flett & Hewitt, 2002; Frost, Marten, Lahart, & Rosenblate, 1990). Moreover, research has shown that perfectionism is best conceptualized as a multidimensional characteristic (Frost et al., 1990; Hewitt & Flett, 1991; Slaney, Rice, Mobley, Trippi, & Ashby, 2001; see Enns & Cox, 2002, for a review). Cumulative evidence indicates that two major dimensions of perfectionism should be differentiated: perfectionistic strivings and perfectionistic concerns (Frost, Heimberg, Holt, Mattia, & Neubauer, 1993; Stoeber & Otto, 2006). The dimension of perfectionistic strivings captures those facets of perfectionism that relate to perfectionistic standards such as a self-oriented striving for perfection, having high personal standards, and setting exacting standards for one's performance. This dimension has shown to be related to positive processes and outcomes such as adaptive coping strategies and positive affect. In contrast, the dimension of perfectionistic concerns captures those facets of perfectionism that relate to concern over mistakes, doubts about actions, negative feelings of discrepancy between one's results and one's expectations, and concern over others' evaluation of one's performance. This dimension has been shown to be related to negative processes and outcomes such as maladaptive coping strategies and negative affect (see Stoeber & Otto, 2006, for a comprehensive review).

Perfectionism and Performance

The distinction between perfectionistic strivings and perfectionistic concerns is also important when considering how perfectionism relates to performance. Whereas perfectionistic

concerns have not shown consistent relationships with performance (Stoeber & Otto, 2006), numerous studies have found perfectionistic strivings to show positive correlations with performance, particularly academic performance such as exam performance and grade point average (e.g., Accordino, Accordino, & Slaney, 2000; Bieling, Israeli, Smith, & Antony, 2003; Stoeber & Rambow, 2007). Furthermore, studies have found perfectionistic strivings to show positive correlations with performance in the Stroop color-naming task (Kobori & Tanno, 2005), aptitude tests (Stoeber & Kersting, 2007), basketball training (Stoll, Lau, & Stoeber, 2008), triathlon races (Stoeber, Uphill, & Hotham, 2009), and music competitions (Stoeber & Eismann, 2007). Consequently, there is considerable evidence indicating that perfectionistic strivings are associated with higher levels of performance across different domains and various tasks, from simple laboratory tasks to real-word exams and competitions.

Mediating Mechanisms

However, only few studies have investigated the "mechanisms" (Frazier, Tix, & Barron, 2004) that underlie the perfectionistic strivings–performance relationship to try explain *how* perfectionistic strivings lead to higher levels of performance. So far, two mechanisms have been proposed: goal setting and invested time. Regarding goal setting, perfectionistic strivings are thought to lead to higher performance because people high in perfectionistic strivings set themselves higher goals than people low in perfectionistic strivings (Bieling et al., 2003; Kobori, Hayakawa, & Tanno, 2009; Stoeber, Hutchfield, & Wood, 2008) and higher goal setting mediates the perfectionistic strivings–performance relationship (Stoeber, Uphill, & Hotham, 2009). Regarding invested time, perfectionistic strivings are thought to lead to higher performance because people high in perfectionistic strivings invest more time in performance than people low in perfectionistic strivings (Stoeber & Eismann, 2007; Stoeber & Eysenck, 2008). However, while there is supportive evidence for goal setting as a mechanism that may explain the perfectionistic

strivings–performance relationship (Stoeber, Uphill, & Hotham, 2009), supportive evidence for invested time as an explanatory mechanism is still missing. Moreover, the findings regarding perfectionism, invested time, and performance are sketchy and not always consistent.

So far four studies have investigated the relationship between perfectionism, time investment, and performance. The first study (Slade, Newton, Butler, & Murphy, 1991) investigated performance in a simple letter-search task: Participants were required to find a target letter in a series of slides, half of which contained the target letter and half of which did not. Results showed that participants high in perfectionism showed a significantly higher task performance (finding more target letters) than participants low in perfectionism, but they did not invest significantly more time in the task. However, Slade and colleagues only measured overall perfectionism and thus did not differentiate between perfectionistic strivings and perfectionistic concerns.

The second study (Bieling et al., 2003) investigated exam performance in undergraduate students. As expected, perfectionistic strivings showed a positive correlation with exam performance: Students high in perfectionistic strivings achieved higher grades in a mid-term exam than students low in perfectionistic strivings. In addition, students high in perfectionistic strivings indicated their plan to study more in the future than students low in perfectionistic strivings. However, perfectionistic strivings showed no significant correlation with the future number of hours students planned to invest for studying.

The third study (Stoeber & Eismann, 2007) investigated how perfectionism was related to the amount of time that young talented musicians spent practicing. Results showed that perfectionistic strivings were positively correlated with time spent practicing. Moreover, perfectionistic strivings were positively correlated with performance: Musicians high in perfectionistic strivings had higher grades in their music classes and had won more prizes in

national competitions than musicians low in perfectionistic strivings. However, the authors did not conduct any mediation analyses. Consequently, it is unclear whether time spent practicing mediated the relationship between perfectionism and performance (grades, prizes).

The fourth and most recent study (Stoeber & Eysenck, 2008) investigated perfectionism and proof-reading performance in undergraduate students. As expected, perfectionistic strivings showed a positive correlation with time on task. However, the correlation was only small and did not reach standard levels of significance ($p > .05$). Moreover, and contrary to expectations, students high in perfectionistic strivings did not perform better than students low in perfectionistic strivings. Finally, the proof-reading task that Stoeber and Eysenck (2008) used had a serious limitation. Because the task required participants to find spelling errors and grammar errors, task performance was to a large extent dependent on participants' pre-existing knowledge of spelling and grammar. This task characteristic may have severely limited the influence of perfectionistic strivings on task performance and invested time: No matter how much participants wanted to achieve a perfect performance and no matter how much time they were willing to invest, if they had a weak knowledge of spelling and grammar, they could not achieve a high performance score in the proof-reading task. Consequently, it would be important to reinvestigate the relationship between perfectionism, invested time, and task performance using a task in which everyone—independent of pre-existing knowledge—could in principle achieve a high (or even a perfect) performance score.

The Present Study

The aim of the present study was to reinvestigate the relationship between perfectionism, invested time, and task performance (a) differentiating between perfectionistic strivings and perfectionistic concerns, (b) using a simple letter-search task to measure task performance, and (c) using time on task as an indicator of invested time. In addition, we aimed to examine how

perfectionists rate the subjective effort they invest in task performance with regard to two aspects of task performance: speed and accuracy. In line with previous findings, we expected participants high in perfectionistic strivings to invest more time in the task (i.e., spend more time on the task to complete the task) and achieve a higher task performance than participants low in perfectionistic strivings. Moreover, we expected time on task to mediate the perfectionistic strivings–performance relationship. In contrast, we did not have clear expectations regarding how perfectionistic strivings and perfectionistic concerns would be related to self-rated speed and accuracy. While, from a theoretical perspective, it could be expected that perfectionists put more importance on accuracy than on speed regarding their task performance (e.g., Slade et al., 1991), no study we are aware of has investigated how perfectionists self-rate their efforts regarding speed and accuracy.

Method

Participants and Procedure

A sample of $N = 100$ participants (18 male, 82 female) was recruited from the student body of a large British university. Mean age of participants was 20.8 years ($SD = 6.3$, range = 18-59). Participants were recruited via the Research Participation Scheme (RPS), an online system where university students can sign up to participate in studies conducted at the School of Psychology. The study was announced as a study on "Personality and Performance." In exchange for participation, participants received extra course credit.

The study was approved by the school's ethics committee and followed the British Psychological Society's code of conduct and ethical guidelines (British Psychological Society, 2005). Students, who indicated interest to participate in the study, were contacted by email and invited to the lab for a test session. To avoid group pressure, all sessions were held individually (one participant per session). Participants first completed an informed consent sheet. Then they

completed the perfectionism measure, performed the letter detection task, and finally completed the effort ratings. Afterwards all participants were fully debriefed. For each participant, the lab was reserved for 45 minutes. Completing the informed consent sheet and the questionnaires (perfectionism, subjective effort) took about 15-20 minutes, and completing the letter detection task took less than 10 minutes (see MS, Table 1, Time on task). Consequently, all participants had sufficient time to work on the letter detection task at their preferred speed.

Measures

Perfectionism. To measure perfectionistic strivings, we used the Striving for Perfection Scale (Stoeber & Rambow, 2007). The scale comprises five items capturing striving for perfection (e.g., "I strive to be as perfect as possible"). To measure perfectionistic concerns, we used the Concern over Mistakes subscale from the Frost Multidimensional Perfectionism Scale (Frost et al., 1990). The scale comprises nine items capturing concern over mistakes and other peoples' negative reactions (e.g., "People will probably think less of me if I make a mistake"). Students responded to all items on a 7-point answer scale from "strongly disagree" (1) to "strongly agree" (7). Both scales have shown high reliability and validity in numerous studies (e.g., Frost et al., 1990; Stoeber & Rambow, 2007) and are reliable and valid indicators of the two main dimensions of perfectionism, perfectionistic strivings and perfectionistic concerns (e.g., Frost et al., 1993; Stoeber, Stoll, Salmi, & Tiikkaja, 2009). With Cronbach's alphas of .88 (striving for perfection) and .84 (concern over mistakes), both scales' scores displayed satisfactory reliability (Nunnally & Bernstein, 1994).

Task performance and time on task. To measure task performance and time on task, a letter detection task was programmed using E-Prime® computer software. The task was adopted from the letter detection task used by Tallis, Eysenck, and Mathews (1991). In their version of the task, participants were seated in front of a computer screen that presented a series of slides, containing letters, with the instruction to search for the letter "E." In our version of the task, participants

were presented 100 slides, each containing 25 letters and numbers ordered in a 5 × 5 array (see Figure 1). Half of the slides (50 slides) contained an "E," and half of the slides (50 slides) did not contain an "E." Participants were instructed to press a designated key when they found an "E" on the slide (E present) and another designated key when they did not find an "E" on the slide (E absent). The designated keys were P and Q on the standard computer keyboard. Key assignments were counterbalanced and randomly assigned: For one half of the participants, P was the key for "E present" and Q the key for "E absent;" and for the other half, Q was the key for "E present" and P the key for "E absent." Participants were instructed to respond to each slide "as quickly and as accurately as possible." Participants first performed a test trial with 5 slides to make sure they understood the task and the key assignments. Then they performed the main trial (100 slides). Time on task (time to complete the task, from the first slide presented to the last key pressed) was measured by the computer software. Task performance was calculated as the number of correct responses (possible range: 0-100).[1]

   Subjective effort. To measure subjective effort with regard to speed and accuracy we used single-item scales based on the Rating Scale of Mental Effort (RSME; Zijlstra, 1993) which is a widely used reliable and valid measure of mental effort. The RSME measures effort with a 0-15 cm visual analogue scale from "absolutely no effort" to "extreme effort." To measure speed and accuracy, we adapted the scale to measure (a) effort invested in speed and (b) effort invested in accuracy. Moreover, to simplify data entry, we changed the answer scale from a visual analogue scale to a Likert scale (e.g., Hardy & Hutchinson, 2007). Speed was measured with one item asking "How hard did you try to be as FAST as possible?" and a 16-point answer scale from 0 ("I did not try at all") to 15 ("I tried extremely hard"). Accuracy was measured with one item asking "How hard did you try to be as ACCURATE as possible?" and the same 16-point answer scale as for speed.

Preliminary Analyses

Multivariate outliers. Because multivariate outliers can severely distort the results of correlation, regression, and mediation analyses, we inspected the data for multivariate outliers. Two female participants showed a Mahalanobis distance greater than the critical value of $\chi^2(6) = 22.46$, $p < .001$ (see Tabachnick & Fidell, 2007) and were excluded from the analyses.

Gender. To examine whether the variance–covariance matrices differed between male and female participants, we computed a Box's *M* test (see again Tabachnick & Fidell, 2007). Box's *M* = 15.97 was nonsignificant with $F(21, 3449) < 1$, $p > .87$, indicating that the matrices were not different. Consequently, data were collapsed across gender.

Results

Correlations

First, we inspected the bivariate correlations between the variables (see Table 1). As expected, striving for perfection showed a significant positive correlation with time on task and with task performance. Students high in striving for perfectionism spent more time on the task and achieved higher scores on the task, compared to students low in striving for perfection. In contrast, concern over mistakes—while showing the expected positive correlation with striving for perfection—did not show any significant correlations with time on task or task performance.

Regression and Mediation Analyses

Next, we investigated whether time on task was responsible for the positive relationship between striving for perfection and task performance. For this, we computed three regression analyses. First, we regressed time on task on striving for perfection. Second, we regressed task performance on striving for perfection. Third, we regressed task performance simultaneously on striving for perfection and time on task (see Baron & Kenny, 1986). The results showed that time on task fulfilled Baron and Kenny's (1986) three conditions for mediation effects (see Figure 2):

(a) striving for perfection predicted time on task and task performance, and (b) time on task predicted task performance, but (c) when the influence of time on task was controlled for, the effect of striving for perfection on task performance was no longer significant. To test the mediation effect for significance, we followed the procedures provided by Preacher and Hayes (2004). As expected, the Sobel test was significant with $z = 3.22$, $p < .01$, and the bootstrap test of the indirect effect did not include zero (bootstrapped 95% CI from 0.34 to 1.40) (see Preacher & Hayes, 2004, for details). Time on task fully mediated the relationship between striving for perfection and task performance.

Speed versus Accuracy

Finally, we investigated whether perfectionism was associated with differences relating to how participants rated the subjective effort they invested in the task regarding speed and accuracy (see Table 1). Striving for perfection showed a small negative correlation with speed and a small positive correlation with accuracy, but both correlations were not significant ($p > .05$). However, when we contrasted speed and accuracy by computing difference scores to indicate the relative importance of speed versus accuracy,[2] striving for perfection showed a significant negative correlation with the speed-versus-accuracy scores (Table 1). While participants low in striving for perfection indicated they invested more effort in speed than in accuracy, participants high in striving for perfection indicated they invested more effort in accuracy.

Discussion

The aim of the present study was to investigate the relationship between perfectionism, time on task, and task performance. To this aim, the study investigated how perfectionistic strivings affected performance in a simple letter-search task, and whether time on task mediated the relationship between perfectionistic strivings and task performance, using a sample of university students. As expected, perfectionistic strivings predicted higher task performance.

Moreover, the effect of perfectionistic strivings on task performance was fully mediated by time on task. This mediation effect suggests that students high in perfectionistic strivings achieved a higher task performance than students low in perfectionistic strivings because they invested more time in the task than students low in perfectionistic strivings. After completing the task, students rated the subjective effort they put in the task. Students high in perfectionistic strivings indicated they invested more effort in accuracy than in speed, whereas students low in perfectionistic strivings indicated they invested more effort in speed than in accuracy. For students high in striving for perfection, accuracy was more important, whereas for students low in perfectionistic strivings, speed was more important.

The present findings provide further evidence that perfectionistic strivings are associated with higher performance. In particular, the findings show that perfectionistic strivings predict higher task performance in simple self-paced tasks where performance is to a large extent determined by how much time participants invest in the task. Moreover, by showing that time on task fully mediated the perfectionistic strivings–performance relationship, the present findings present evidence that invested time (time on task) represents a mechanism that can explain *how* perfectionistic strivings lead to higher task performance. The present findings suggest that people high in perfectionistic strivings invest more time in tasks and thus achieve a higher task performance than people low in perfectionistic strivings. This may be particularly the case for simple self-paced tasks like the one used in the present study, that do not require any pre-existing knowledge (e.g., grammar, spelling; cf. Stoeber & Eysenck, 2008) so that all participants can, in principle, achieve a perfect score—if they take their time. Moreover, the present findings show that accuracy is more important to perfectionists than speed. Perfectionists have a strong need to get everything right (Mallinger, 2009), but are often left with the feeling that something is not just right (Coles, Frost, Heimberg, & Rhéaume, 2003). Consequently, simple self-paced tasks that, with

proper attention, allow one to reach a perfect result may be particularly attractive for people striving for perfection, because these tasks—unlike more complex tasks and real-world problems—present the opportunity to get everything right and obtain a perfect score.

Finally, the present findings again confirm that it is important to differentiate between perfectionistic strivings and perfectionistic concerns (Frost et al., 1993; Stoeber & Otto, 2006). In line with the majority of studies investigating perfectionism and performance, the present study found that only perfectionistic strivings predicted task performance, but not perfectionistic concerns. In addition, only perfectionistic strivings predicted spending more time on the task and, when subjective effort was assessed after the task, was associated with a preference for accuracy over speed. Thus, it appears as if people high in perfectionistic concerns are mainly concerned about how others judge their performance and how making mistakes will make a bad impression on others (Hewitt & Flett, 1991; Frost et al., 1990). These worries and concerns, however, do not seem to have an effect on their performance. In contrast, perfectionistic strivings do have an effect on performance. People who strive for perfection and have perfectionistic personal standards usually outperform people who do not have such extreme strivings and standards.

The present findings have some limitations, however. First, the present study used only two subscales to assess the two dimensions of perfectionism, perfectionistic strivings and perfectionistic concerns. Whereas the two subscales have proved to be reliable and valid indicators of the two dimensions (e.g., Stoeber, Stoll, et al., 2009), future studies should include additional subscales to measure the broad dimensions of perfectionism (see Stoeber & Otto, 2006). Second, the present findings are restricted to self-paced tasks. Only in self-paced tasks can people choose to invest more time in the task (and achieve higher performance). However, this is not possible in timed tasks such as aptitude tests (e.g., Stoeber & Kersting, 2007) or exams (e.g., Bieling et al., 2003). In timed tasks, time on task is limited (and in the case of aptitude tests, strictly limited) and

thus cannot explain why perfectionistic strivings lead to higher performance. Here other mechanisms must be at work, for example, setting higher performance goals (Stoeber, Uphill, & Hotham, 2009) or investing more mental and attentional effort (Stoeber & Eysenck, 2008). Finally, the subjective effort ratings (speed, accuracy) were solicited after the task. Consequently, they may have been influenced by participants' subjective impression of their task performance (e.g., participants, who finished the 100 slides faster than expected, may have *inferred* that they put more effort in speed even though they actually put more effort in accuracy). Consequently, the findings need to be carefully interpreted. Moreover, future studies may use designs that allow one to solicit subjective effort ratings during task performance (e.g., by prompting participants at a random time during the task to rate their effort). However, such designs need to carefully weigh the possible advantages against possible disadvantages (e.g., performance disruption, change of speed-versus-accuracy focus after prompting) and demonstrate that the assessments they produce are more reliable and valid than assessments solicited directly after task performance.

Notwithstanding these limitations, the present findings make a significant and novel contribution to further our understanding of perfectionism and task performance. Showing that time on task explains the relationship between perfectionistic strivings and task performance, they provide first empirical evidence that invested time is an important mechanism that can explain how perfectionistic strivings lead to higher task performance in simple self-paced tasks.

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Footnotes

[1]Further technical details of the task are available from the first author upon request.

[2]We standardized the speed and accuracy ratings before computing difference scores (speed

versus accuracy = standardized speed ratings – standardized accuracy ratings) to give speed and

accuracy equal weight in the difference scores (see correlations of speed and accuracy ratings with

speed-versus-accuracy scores in Table 1).

Table 1

Descriptive Statistics and Correlations

Variable	*M*	*SD*	Min	Max	Correlation					
					1	2	3	4	5	6
Perfectionism										
1. Striving for perfection	4.05	1.21	1.20	6.60						
2. Concern over mistakes	3.00	0.87	1.22	5.56	.53***					
Letter detection task										
3. Time on task	4.72	1.28	2.16	9.42	.36***	.10				
4. Task performance	91.64	5.02	78	100	.28**	−.12	.59***			
Subjective effort										
5. Speed	11.54	2.28	4	15	−.17	−.04	.03	.13		
6. Accuracy	12.66	1.78	7	15	.18	.07	.25*	.21*	.37***	
7. Speed versus accuracy	0.00	1.12	−3.05	3.26	−.31**	−.10	−.20+	−.07	.56***	−.56***

Note. N = 98. Perfectionism: mean scores with answer scale from 1 = "strongly disagree" to 7 = "strongly agree." Time on task = time (in minutes) invested to complete the task. Task performance = number of correct responses (maximum possible score = 100). See Method section for details.
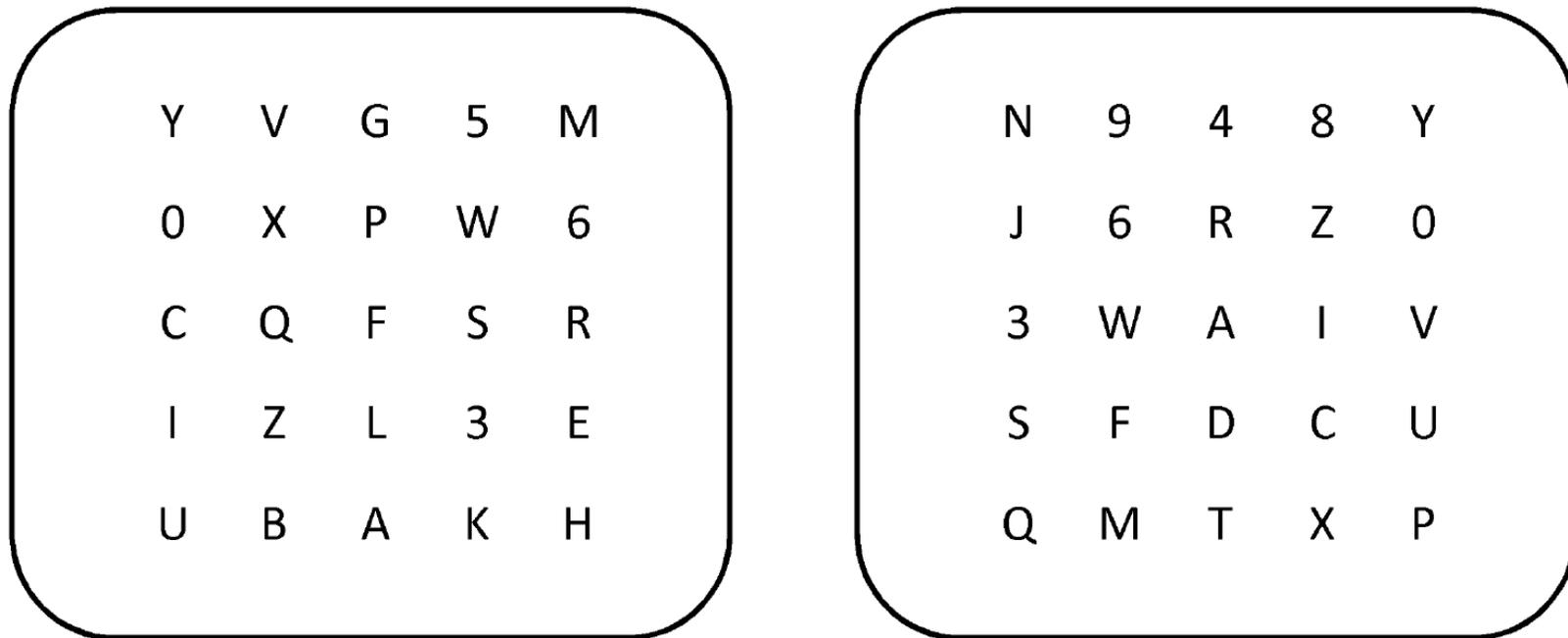
+*p* = .05. **p* < .05. ***p* < .01. ****p* < .001.

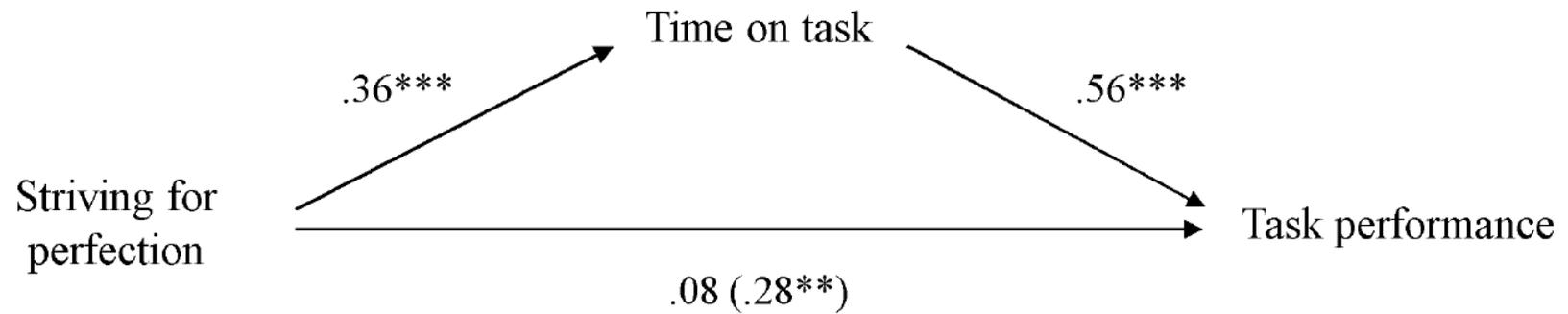*Figure 1*. Sample slides: The left slide contains an "E," the right slide does not.

Figure 2. Time on task fully mediates the relationship between striving for perfection and task performance (standardized regression coefficients: **$p < .01$, ***$p < .001$).