The influence of the tidy work environment in the reliability of the conscientious individuals.

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Abstract: Conscientiousness has been the most consistent personality predictor of job performance and people with a high score on this scale are described as reliable. But it is not known if there are variations in the reliability of these individuals when they are in different work environments, i.e. in a tidy environment and in a messy environment. The present paper aims to study if the relationship between the conscientious trait of the employees and their reliability are mediated by the influence of the work environment in which they operate, according to whether or not this environment is tidy or messy. A field experiment is conducted, where subjects performing a simple task in a highly controlled environment are exogenously sorted into two different treatments, a tidy and a messy work environment. The results of this study suggest that a physically messy environment can influence the degree of reliability, in that the people with high conscientiousness tend to commit more mistakes in the task that they work on. Mess can stop motivation of people with high conscientiousness and prevent them from doing their best. These results highlight the importance of high-reliability organizations to improve the conditions of tidiness under which employees work.

Keywords: Tidy environment, Messy environment, Conscientiousness, Human reliability, Human error, Job performance

Category: Research paper

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Introduction

The relationship between personality and job performance has been a frequently studied research topic in Management, Organizational Behavior and Psychology in the last decades. A number of studies have identified that individual behavior at work can be significantly influenced by personality traits and several researchers have studied the predictors of job performance (e.g. Barrick and Mount, 1991, Hough et al., 1990, Ones et al., 1993, Tett et al., 1991). In this paper, an important part of individual performance is considered: reliability. This component of performance is analyzed in the relation between personality trait called conscientiousness and the tidy work-environment. Psychologists have identified literally thousands of personality traits and adjectives that differentiate one person from another. But for some decades, researchers have identified five fundamental factors or dimensions of personality. Each of these factors consists of a group of more specific traits. The five factors are commonly called the "Big Five personality traits". Thus, the Big Five refers to a type of taxonomy or personality traits classification system used to describe personality dimensions (Goldberg, 1990, John, 1989, Digman, 1990, Costa and McCrae, 1992, Costa et al., 1991). This taxonomy has been systematized and recognized as a reference tool for personality analysis and now is especially relevant to organizations in the last decades. The Big Five dimensions are Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness. Costa and McCrae (1995) have suggested that, within each personality dimension, there are facets (essentially first-order factors) that combine to form the entire construct. They described six facets for each domain. The names for each facet are derived from the items that contribute to it. For example, the conscientiousness facets are competence, order, dutifulness, achievement-striving, self-discipline, and deliberation.

From the Big Five personality traits, conscientiousness has been the most consistent personality predictor of job performance across all types of work and occupations (Barrick et al., 2001, Schmidt and Hunter, 1998, Barrick and Mount, 1991, Salgado, 1997, Ones et al., 2007, Mount et al., 1998, Mount et al., 1999, Witt et al., 2002, Witt, 2002, Behling, 1998). Conscientiousness is a broad personality dimension defined as the extent to which a person is able to self-regulate and be purposeful, achievement oriented, responsible, and persistent (Digman, 1990). High conscientiousness people are described as organized, reliable, and ambitious (Costa and McCrae, 1992, John and Srivastava, 2001). Furthermore, they are also skilled planners who maintain impulse control (e.g., act cautiously, delay gratification, and follow rules and norms), which often leads to enhanced task performance (John and Srivastava, 2001). Thus, it is logical that individuals with high conscientiousness have a better performance since they are characterized by a high level of reliability.

Many authors have suggested that some traits of personality may change over time (Mischel and Peake, 1982, Roberts and Caspi, 2001, Helson and Stewart, 1994). The path to finding stability in personality traits requires one to take into account the situation and its impact on an individual; and this may be identified in the stable interactions between traits and circumstances (Mischel, 2004, Cervone, 2004, Furr and Funder, 2004). This would imply that the situation or environment in which the person

is working can alter or modify his expression of conscientiousness, as one traits of personality. This implication leads us to consider the effect it could have on the employee a work environment based on conscientiousness, i.e., a work environment that has the characteristic of to be essentially described with at least one of the facets of the conscientiousness (e.g. tidy work environment). It is interesting to know the effect of this type of work environment on the performance of employees, especially reliability, since this environment is based on a facet of conscientiousness. The present article does not conclude on the dynamic relation between work environment and trait consistency because it does not employ a dynamic methodological framework for observations collected over several time periods. Nevertheless, the cross-sectional model's main results of this article may motivate future researchers to study these dynamic effects in an extended statistical setup, which may evidence changing personality traits in different work environments.

In this article, one of the six facets that compose the conscientiousness, i.e. the order (tidy), is considered. Hence, this work aims to study if there are interactions between work environment based in tidiness and conscientiousness that affect work reliable of the individuals.

To the best of our knowledge, there has been no research on the reliability of employees conditional on both the order trait of work environment and the employees' conscientiousness personality trait. Hence, the contribution of this article is the novelty of having studied the relationships among the following three subjects: work environment based on the trait of order, conscientiousness and reliability of employee.

The remaining part of this article is structured as follows. First, the definitions of order facet are examined to use these concepts as a guide to design a work environment for our experiment. Once the meaning of tidy and messy work environment is defined, it is hypothesized how these environments can mediate in the relation between conscientiousness trait and reliability. Then, an experiment is employed to test these hypotheses and the main empirical results are summarized. Finally, implications of these results and suggestions for future research are discussed.

Defining a work environment based on the order trait

Order facet reflects the tendency to apply structure to one's working environment. According to Costa and McCrae (1992, 1999, 1998), high scores on the order facet are characterized by being neat, tidy, clean and well-organized; keeps things in their proper places. The order as tendency to keep one's environment tidy and well-organized is familiar from several personality inventories (Costa et al., 1991). Low scorers might therefore be described as dirty, messy, untidy, disorganized, slovenly, and sloppy, "but those terms are so harshly evaluative that many psychologists, especially clinicians, would be reluctant to use them. In feedback to the client it would probably be more politic to say 'not well organized' or 'not excessively neat'" (Costa and McCrae, 1998).

The present research focuses on the work environment based on the order. The above definitions of personality trait of order are used as a guide to design a work environment that is based on this trait. In this sense, the *tidy work environment* would be defined as the environment of work where everything is orderly and organized in the right place.

And the *messy work environment* would be defined as the environment of work where everything is untidy and disorganized.

Reliability, work environment and conscientiousness trait

With respect to reliability, an employee that is reliable can be trusted or believed because he/she works or behaves well in the way firm expect. In this sense, reliability is the ability of an employee to perform and maintain his/her expected work in routine circumstances, as well as hostile or unexpected circumstances. The organizations have expectations, which must be concrete and realistic in order that they can assess reliability. Thus, expectations "represent the institutional and role beliefs about how a task is to be performed and typically take the form of rules, regulations, standard operating procedures, organizational goals, and normative standards" (Ramanujam and Goodman, 2003).

Human reliability is related to the field of human performance, which it can be affected by many factors such as age, state of mind, physical health, attitude, emotions, propensity for certain common mistakes, errors, etc. Reliability is the first of the qualities any job performance predictor should posses. Reliability can be measured in a huge number of ways within business. One of these ways is by human error, which it is a cause or contributing factor in wastage and accidents in many types of business. A considerable number of these human errors might be fitted inside what Ramanujam and Goodman (2003) define as *latent errors*. According with these authors the principal characteristics of latent errors are: (1) a set of organizational expectations, (2) deviations from these expectations, and (3) absence of direct consequences. The type of work environment could influence the reliability of the employees, inducing them to work in a defective way or deviations that do not produce direct and immediate adverse consequences.

In summary, we hypothesize that the relationship between conscientious trait of the employees and their reliability are mediated by the influence of the work environment in which they operate, according to if this environment is tidy or messy.

According to the theory that we have seen before in the introduction, individuals with high conscientiousness are more productive and reliable than individuals with low conscientiousness. The question is if these differences in productivity and reliability are maintained in spite of the fact that the work environment is tidy or messy. As a result, we propose the following hypotheses:

Hypothesis 1: In a messy work-environment the employees with high conscientiousness make fewer mistakes than the employees with low conscientiousness.

Hypothesis 2: In a tidy work-environment the employees with high conscientiousness make fewer mistakes than the employees with low conscientiousness.

Besides, one must ask if there are differences in reliability among the individuals with high conscientiousness by the fact of working in a tidy or messy environment. The same question would be for the case of individuals with low conscientiousness. In the past literature, this relationship has not been studied. Therefore, the hypotheses of this article

state that these two types of environments could influence the reliability of the individual. It is more intuitive that a messy environment could influence negative in individual reliability because is an environment that would lead to be annoyed or to be not concentrated on the work. Thus, we propose the following hypotheses:

Hypothesis 3: Employees with high conscientiousness make more mistakes in a messy work environment than in a tidy work environment.

Hypothesis 4: Employees with low conscientiousness make more mistakes in a messy work environment than in a tidy work environment.

Figure 1 depicts the reliability relations that arise in these hypotheses.

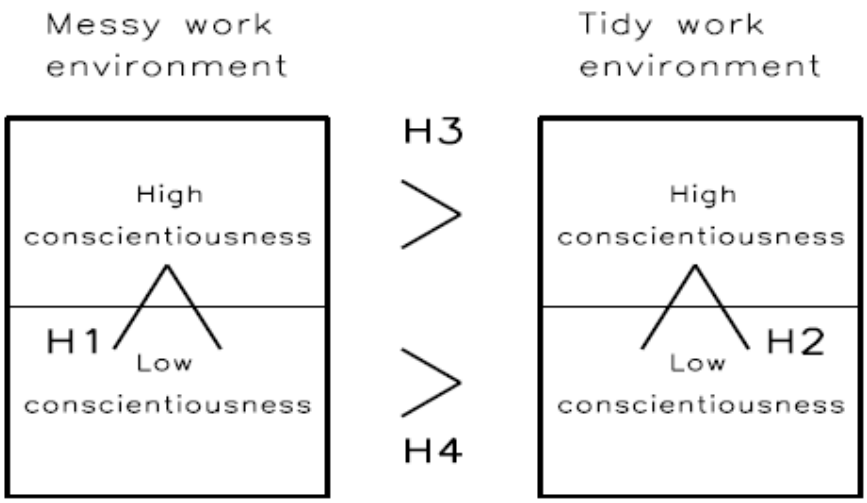

Figure 1. Hypotheses H1-H4 about the average relative errors of individuals in different situations
Note: The signs "less than" (<), "greater than" (>) and "equal" (=) denote in which situation the individuals make less, more or equal mistakes, respectively.

Method

Study design

To test these hypotheses, an experiment is employed. A field experiment is conducted, where subjects performing a simple task in a highly controlled environment are exogenously sorted into two different treatments. The experiment manipulates one independent variable: things in work environment that are evident that are not in its place, i.e. that they are in a messy condition. There are two levels or treatments: a) messy work environment, i.e. an environment of many papers and objects of work scattered on the desk and workplace, where it is evident that these objects were not in its place; b) tidy work environment, i.e. an environment where there is nothing out of

place. The focal dependent variable is the reliability level of the individual. Reliability is measured computing the right answers and the relative error of the individual, i.e. number of incorrect answers divided by number of total answers.

Participants

All of our subjects are university students recruited from different schools of the University. The final dataset comprises 80 students of whom 31 are male and 49 are female. Their median age is 20 years. Fifty four percent of the participants are students of the School of Economics and Business Administration.

Students have been asked in announcements posted on notice boards and Website of University if they would like to do a simple short-term job requiring no previous knowledge. In the announcement, it has been stated that the job is a one-time 2-hour job and it pays € 14 (1 € ≈ 1.35 US$), that it is part of an academic research and also that they would fill out a personality test.

Students have applied by e-mail. After receiving their applications, each participant has been randomly assigned to one of the two treatments and we have informed them of the precise date and location where they are expected to carry out the job. There has been a different date for each treatment. Each participant has come only to one date. A total of 85 subjects have participated in the experiment. Once five clear outliers have been eliminated, there are 39 subjects in the messy work environment treatment and 41 in the tidy work environment treatment. Both treatments have been performed in a computer lab of the University in October 2010.

Procedure and Task

A simple and easy to measure work task is chosen that required no previous knowledge. In this task, students transcribe the results of a survey. A survey through an online program called Encuestafacil.com has been designed (program access is available at: www.encuestafacil.com). The survey simulates a market research about the preferences of recent graduates in the selection of the firms to work. The survey includes multiple choice questions. The answers are chosen by mouse clicks, except the first question in which it is necessary to write the number of the survey.

Before the experiment, we have filled out the survey that we had designed in the online program, in order to create thus the responses of 80 supposedly different individuals. The surveys that we give to the participants are the printed results of the data that we had filled earlier in the online program. Thus, each participant has received a package of 80 surveys that supposedly already had been filled out by 80 different subjects. Each survey has contained 44 answers (inputs) to transcribe (to enter) in the online program. Moreover, each survey has included an identification number and the 80 surveys have been arranged in ascending order according to this number. The objective of the participants has been to transcribe the surveys in the order in which has been given them. The surveys data, type and model of computer, identification numbers and order of the surveys are the same for all participants.

Upon arrival, subjects are welcomed and informed about their task of transcribing the results of a survey and the procedural details. Thus, participants probably have perceived this task as a "real" work. The participants have not known neither what duration of the two contracted hours is to be spent to work. Moreover, they have not been informed about that their work performance has been measured. They have worked one hour in the transcription of the surveys. Afterwards, they have filled in the NEO PI-R personality test and finally they have filled in a brief questionnaire about their impressions of the physical environment of work in which they have worked. Payment is independent of output and has been paid by electronic transfer. The procedure is exactly the same for both treatments.

In the messy treatment, participants have a work environment with many papers and documents on the desks that are unnecessary; pencils, clips, staples scattered on the desks and floor; many papers and some empty boxes scattered on the floor. It is important to clarify that the location of these things does not interfere with the operating capacity of the participants, i.e. they have had sufficient free space on the desk to maneuver the surveys. In contrast, in the tidy work environment treatment, there have not been untidy or unnecessary things both on the desks and in the floor. Thus, on the desks of the participants there have been only the surveys and the computer.

Measures

Reliability. Reliability is measured computing the relative error of the individual, i.e. number of incorrect inputs divided by number of total inputs. Each survey answer that the participant clicked on is counted as an input. The identification number of each survey that he/she had to transcribe is also counted as an input. An input is considered to be correct when the participant enters an answer that coincides with respective survey received in the beginning of the work task. If a participant omitted or repeated a survey, this was counted as 44 incorrect inputs, i.e. the total number of inputs of the survey. The program of the website Encuestafacil.com has a tool that collects in an Excel sheet all the answers (inputs) filled in by the participants. This allows us to compare the answers of the participants with the answers filled out previously by us.

Conscientiousness. The Revised NE0 Personality Inventory (NEO PI-R) (Costa and McCrae, 1992) is used to measure the Conscientiousness factor, which is a 240 item set of self-statements that assess the five dimensions of personality along with six facet scales for each factor. This is an instrument with well-established reliability and validity (Costa and McCrae, 1992).

Work environment. A short questionnaire has been employed to ask participants about how they have perceived the physical environment of work: tidy-untidy and other physical conditions. The aim of this questionnaire is to confirm if the participants have perceived the environment according to the type of treatment that they have been assigned.

Clustering with respect to conscientiousness

In order to study the hypotheses stated before, individuals with high and low conscientiousness are identified in the sample. Two clusters of high and low

conscientiousness individuals are formed for each treatment (tidiness and mess) separately. This clustering procedure yields the next four groups (G) of individuals from the sample:

(G1) high conscientiousness (*h*) individuals in the treatment of tidiness (*t*),
(G2) low conscientiousness (*l*) individuals in the treatment of tidiness (*t*),
(G3) high conscientiousness (*h*) individuals in the treatment of mess (*m*), and
(G4) low conscientiousness (*l*) individuals in the treatment of mess (*m*).

Each treatment is clustered separately instead of clustering the pooled sample of both treatments because the fact of tidiness or mess may affect the measurement quality of the conscientiousness variable and clustering the two treatments separately can control for this problem and therefore provide more robust results.

The clusters of conscientiousness are created using the Ward's linkage clustering procedure (Ward, 1963) and the Euclidean distance measure is used in the clustering procedure. Ward's linkage clustering method is applied because several past papers, which compare alternative clustering techniques, conclude that Ward's method tends to identify better clusters than other methods. For example, Kuiper and Fisher (1975) in a Monte Carlo comparison of six agglomerative procedures, find Ward's method generally the best, followed closely by the complete linkage method. Moreover, Jain et al. (1986) conclude that the complete linkage and Ward's methods are generally superior to other hierarchical clustering methods.

Comparison of cluster means

After forming two groups for each treatment, the four hypotheses stated previously are tested by comparing the mean relative errors of each two clusters stated in the hypothesis. First, the following notation is introduced for the mean relative error of individuals in each group G1-G4 defined in the previous subsection:

(G1) Let μ_{ht} denote the mean relative error of high conscientiousness individuals in the treatment of tidiness.

(G2) Let μ_{lt} denote the mean relative error of low conscientiousness individuals in the treatment of tidiness.

(G3) Let μ_{hm} denote the mean relative error of high conscientiousness individuals in the treatment of mess.

(G4) Let μ_{lm} denote the mean relative error of low conscientiousness individuals in the treatment of mess.

Using this notation, the four hypotheses presented before can be reformulated as follows:

H1: When there is messy work environment, the mean relative error of low conscientiousness individuals μ_{lm} is greater than to the mean relative error of high conscientiousness individuals μ_{hm}, i.e. $\mu_{lm} > \mu_{hm}$.

H2: When there is tidy work environment, the mean relative error of low conscientiousness individuals, μ_{lt} is greater than to the mean relative error of high conscientiousness individuals μ_{ht}, i.e. $\mu_{lt} > \mu_{ht}$.

H3: The mean relative error of high conscientiousness individuals in a messy work environment μ_{hm} is greater than high conscientiousness individuals in a tidy work environment μ_{ht}, i.e. $\mu_{hm} > \mu_{ht}$.

H4: The mean relative error of low conscientiousness individuals in a messy work environment μ_{lm} is greater than low conscientiousness individuals in a tidy work environment μ_{lt}, i.e. $\mu_{lm} > \mu_{lt}$.

Notice that each hypothesis is about the comparison of mean relative errors between two clusters.

Therefore, the H1-H4 hypotheses can be verified by the following three alternative two-sample mean difference tests (T):

(T1) two-sample mean difference test with equal variance;

(T2) two-sample mean difference test with unequal variance and use Satterthwaite's (1946) approximation formula to evaluate the significance of the test statistic; and

(T3) two-sample mean difference test with unequal variance and use Welch's (1947) approximation formula to evaluate the significance of the test statistic.

The T1 test assumes that the variance of relative errors in both clusters is equal. However, T2 and T3 do not make this restrictive assumption and employ alternative approximation formulas in order to evaluate the significance of the corresponding test statistic. As a consequence, the three alternative test results check for the robustness of the two-sample mean difference tests.

Results

The results of the work environment questionnaire confirm that the participants had perceived the environment according to the type of treatment that they were assigned. The 93% of participants in treatment of mess answered that the room was very messy. The 55% of participants in treatment of tidiness answered that the room was very tidy and 29% that the room was slightly tidy.

Table I summarizes some descriptive statistics of the conscientiousness and relative error variables for the pooled sample of individuals and for various subgroups of the full sample. The pooled sample is divided by two binary variables: the type of treatment (tidiness and mess) and the cluster of the level of conscientiousness (high or low). Table 1 informs about the distribution of individuals in the different groups reporting the number of individuals for each group. Moreover, Table 1 presents the mean and standard deviation of conscientiousness and relative error for the pooled sample and its subgroups.

Table I. Descriptive statistics of data

Conscientiousness		Messy WE	Tidy WE	Total	Relative error		Messy WE	Tidy WE	Total
Low consc.	Count	21	34	55	Low consc.	Count	21	34	55
	Mean	34.00	39.21	37.22		Mean	1.43%	1.56%	1.51%
	SD	3.63	6.53	6.12		SD	1.72%	2.62%	2.30%
High consc.	Count	18	7	25	High consc.	Count	18	7	25
	Mean	46.61	59.43	50.20		Mean	3.92%	0.68%	3.02%
	SD	3.90	5.03	7.18		SD	4.48%	0.63%	4.07%
Total	Count	39	41	80	Total	Count	39	41	80
	Mean	39.82	42.66	41.28		Mean	2.58%	1.41%	1.98%
	SD	7.37	9.91	8.83		SD	3.48%	2.42%	3.02%

Note: The SD denotes standard deviation. The Messy WE and Tidy WE refer to messy work environment and tidy work environment, respectively.

Table II summarizes the results of the two-sample mean comparison tests. These tests evaluate the four hypotheses H1-H4 of this article. First, tests T1, T2 and T3 reject the H1 hypothesis ($\mu_{lm} > \mu_{hm}$) at the 5 percent level of significance. We evidence that the opposite relation is significant at the 5 percent level of significance: $\mu_{lm} < \mu_{hm}$. Thus, high conscientiousness individuals on average make more relative errors than low conscientiousness individuals when both are in a messy work environment. Second, the T2 and T3 tests accept the H2 hypothesis at the 5 percent level of significance, i.e. $\mu_{lt} > \mu_{ht}$. Thus, low conscientiousness individuals on average make more relative errors than high conscientiousness individuals when they are in a tidy work-environment. Third, the T1, T2 and T3 mean comparison tests evidence that $\mu_{hm} > \mu_{ht}$, i.e. when high conscientiousness individuals are considered, the level of relative errors have committed is higher in treatment of mess than in tidiness treatment. Thus, we accept H3. Fourth, all mean comparison tests reject H4 ($\mu_{lm} > \mu_{lt}$), i.e. we find that $\mu_{lm} = \mu_{lt}$. This means that independently of the tidiness or mess of the working place, low conscientiousness individuals perform the same level of relative errors during their work.

Table II. Two-sample mean comparison test results

H1	H_0:	$\mu_{lm} = \mu_{hm}$	$\mu_{lm} = \mu_{hm}$	H2	H_0:	$\mu_{lt} = \mu_{ht}$	$\mu_{lt} = \mu_{ht}$
	H_a:	$\mu_{lm} < \mu_{hm}$	$\mu_{lm} > \mu_{hm}$		H_a:	$\mu_{lt} < \mu_{ht}$	$\mu_{lt} > \mu_{ht}$
	T1	**1.2%**	98.8%		T1	80.6%	19.4%
	T2	**1.8%**	98.2%		T2	95.4%	**4.6%**
	T3	**1.8%**	98.2%		T3	95.4%	**4.6%**

H3	H_0:	$\mu_{hm} = \mu_{ht}$	$\mu_{hm} = \mu_{ht}$	H4	H_0:	$\mu_{lm} = \mu_{lt}$	$\mu_{lm} = \mu_{lt}$
	H_a:	$\mu_{hm} < \mu_{ht}$	$\mu_{hm} > \mu_{ht}$		H_a:	$\mu_{lm} < \mu_{lt}$	$\mu_{lm} > \mu_{lt}$
	T1	96.4%	**3.6%**		T1	42.1%	57.9%
	T2	99.6%	**0.4%**		T2	41.3%	58.7%
	T3	99.6%	**0.4%**		T3	41.3%	58.7%

Note: The table presents the p-values associated to the mean comparison T1, T2 and T3 test statistics. The T1 test assumes that the variance of the variable is equal in the two samples. The T2 and T3 tests assume that the variance of the variable is not equal in the two samples and apply the Satterthwaite (1946) and Welch (1947) approximation formula, respectively, to evaluate the significance of the test statistic. The *l*, *h*, *t* and *m* sub indices of the expected values μ denote low conscientiousness, high conscientiousness, treatment in tidy work-environment and treatment in messy work-environment, respectively. Figures in bold script indicate the acceptance of the alternative hypothesis at 5 percent level of significance.

Figure 2 presents these findings on the relations of relative errors among different groups of the sample studied.

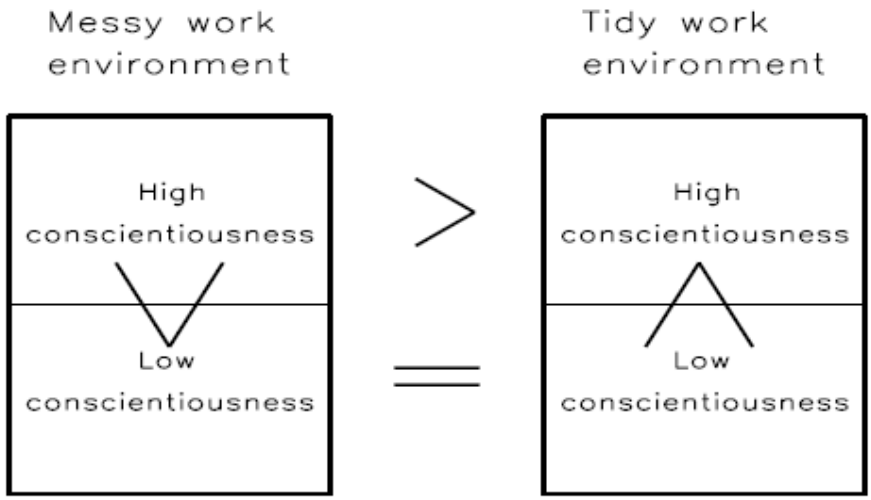

Figure 2. Implications of the two-sample mean comparison test results on group mean relations
Note: Figure shows the results about in which situation the participants make more (>), less (<) or equal (=) mistakes.

In Figure 3, we can see the negative influence that has messy environment in reliability of people with high conscientiousness. Figure shows that the level of relative error is highest in the case of individuals with high conscientiousness that are in a messy environment, i.e. they make even more mistakes than those individuals with low conscientiousness in messy and tidy environments.

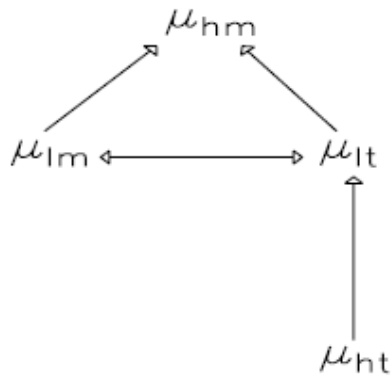

Figure 3. Relative error mean in relation with the other groups
Note: The arrows show decreasing level of relative error. The double arrow shows equal level of relative errors.

Discussion

There are many studies that suggest that people with high conscientiousness tend to have a better performance in his/her work and therefore a better reliability. Nevertheless, the results of this study suggest that a physically messy environment can influence in the reliability degree, doing that the people with high conscientiousness tend to commit more mistakes in the task that they work. Thus, the reliability of these individuals is lower when they are compared with individuals with high conscientiousness in a tidy work environment, as well when they are compared with individuals with low conscientiousness in a messy and tidy work environment, as specified in Figure 3. One way to explain this negative influence could be because conscientious people like the appearance of orderliness and tidiness, i.e. they have tendency to keep their environment tidy and well organized and being in a messy environment perhaps makes them feel uncomfortable, annoying or to be not concentrated on their work.

On the other hand, when people with high conscientiousness are in a tidy environment then there are fulfilled the predictions of that they are more reliable than people with low conscientiousness. This result indicates that tidiness could promote that those individuals with high conscientiousness feel comfortable to work concentrated on their task and behave with the level of reliability that characterizes their personality trait.

Mess can stop motivation of people with high conscientiousness and prevent them from doing their best. They will not do their work as well as they can, because they are intolerant with mess and therefore a messy environment keeps them from focusing on their work by constantly demanding their attention. Their lack of concentration in this kind of environment could influence their reliability, inducing them to work in a defective way or to make mistakes. This mean a greater expense in the production since it would imply a greater waste in the consumed resources. This fact has even more relevancy for work environments where are bring into play the life of other people, such as operating rooms, pharmaceutical laboratories, air traffic control towers, nuclear

power plants, etc. It is important that the physical working environment in these places be tidy, for thus avoid errors that could be fatal.

People with low conscientiousness perform the same level of mistakes in a messy work environment than in a tidy work environment. This result may mean that mess do not influence in their level of concentration on their work, probably because low scores on the conscientiousness scale correlate with people who are unorganized and therefore they are more accustomed to living in an environment like that.

From a practical point of view, when the work environment is tidy, the results provide empirical evidence that conscientiousness trait should be congruent with the performance criterion that it is seeking to predict. Nevertheless, this criterion changes when the environment is mess. On the basis of this result, performance prediction can be improved by accounting the level of tidiness in environment as a potential moderator of relationships between personality and job reliability.

People are fallible, even the best make mistakes. It is human nature to err. Because of their fallibility or innate characteristic of imprecision, human beings are vulnerable to many external conditions that cause them be unreliable. Vulnerability to such conditions makes people susceptible to error. "Countermeasures are based on the assumption that although we cannot change the human condition, we can change the conditions under which humans work" (Reason, 2000). The messy work-environment possesses the characteristics to be called as *latent error*, in the sense that this mess is a "deviation that does not produce direct and immediate adverse consequences" but it is a "condition that deviates from expectations, and may cause adverse consequences of organizational significance" (Ramanujam and Goodman, 2003). Thus, a distinguishing feature of high-reliability organizations should be their collective preoccupation to improve the conditions of tidiness under which employees work.

Finally, this work has several limitations. First of all, the sample is small with eighty participants. Second, the task was restricted to introduce data in a computer. There are several kinds of tasks where the response of workers to the tidy work environment could be different. It is necessary develop new experiments with other tasks. Another limitation is that only there were seven participants with high conscientiousness in the treatment of tidy environment. Nevertheless, this is the first attempt to quantify the importance of tidy work environment in terms of moderator of relationships between personality and job reliability, and may contributes to reduce wastage and accidents in many types of business.

Conclusions

The most important contribution of this research is the novelty of having studied the relation that exists among these three subjects: work environment based on the tidiness, conscientiousness trait and reliability of employee. The results offer some insight into the process through which a work environment based in tidiness affects reliability of people with high conscientiousness. The finding of differential results for tidy and messy environment suggests not only that people with high conscientiousness commit more mistakes in a messy environment than in a tidy environment but also that they

commit more mistakes than people with low conscientiousness when both are in a messy environment.

The main conclusion of this experiment is that there is empirical evidence to support the suggestion that a tidy work environment can influence the reduction of mistakes and improve reliability in workers with high conscientiousness. More generally, our research suggests that it is important that managers ensure that the environment in where employees are working should be usually tidy, instilling in them values and methods that promote tidiness, achieving by this way a better reliability in the employees.

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