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Propensity for Superstitious Learning at Work operationalized in three dimensions: overconfidence, lack of reflection, and late and ambiguous feedback

Propensão à Aprendizagem Supersticiosa no Trabalho operacionalizada em três dimensões: excesso de confiança, falta de reflexão e *feedback* tardio e ambíguo

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Abstract
The aim of the article was to operationalize the propensity for superstitious learning (PSL) as a three-dimensional construct: overconfidence, lack of reflection, and late and ambiguous feedback, with dependent variables being complaints, rework, and errors at work. PSL occurs when the learning experience is convincing but the connections between causes and effects are incorrect. A total of 173 valid responses were obtained and analyzed using SmartPLS 4 software. The late feedback item was excluded because it showed a non-significant factor load, and it was grouped with the ambiguous feedback construct due to a high correlation. These modifications met the criteria for validity and reliability. The relationship between late and ambiguous feedback and the frequency of complaints, rework, and errors was confirmed. It is noteworthy the development of the late/ambiguous feedback scale and the warning about the importance of reflection, even in the face of positive results.
Keywords: Superstitious learning; Overconfidence; Late feedback.

Resumo
O objetivo do artigo foi operacionalizar a propensão à aprendizagem supersticiosa (PAS) como um construto tridimensional: excesso de confiança, falta de reflexão e *feedback* tardio e ambíguo, tendo como variáveis dependentes a reclamação, o retrabalho e os erros no trabalho. A PAS ocorre quando a experiência da aprendizagem é convincente, mas as conexões entre causas e efeitos não são corretas. Foram obtidas 173 respostas válidas e analisadas no software SmartPLS 4. O *feedback* tardio teve um item excluído por apresentar carga fatorial não significante e foi agrupado com o construto *feedback* ambíguo por apresentarem alta correlação. Essas modificações atenderam aos critérios de validade e confiabilidade. Foi confirmada a relação entre o *feedback* tardio e ambíguo com a frequência de reclamações, retrabalhos e erros. Destacam-se o desenvolvimento da escala de *feedback* tardio/ambíguo e o alerta sobre a importância da reflexão, mesmo diante de resultados positivos.
Palavras-chave: Aprendizagem supersticiosa; Excesso de confiança; *Feedback* tardio.

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1 Introduction

Superstitious learning occurs when there is an incorrect interpretation between cause and effect of the actions taken previously, leading to the wrong conclusions about how to handle future challenges considering past experiences (Levitt, 1988 e Zollo, 2009). In opposition to conventional learning, where there is a precise correlation between cause and effect, imprecise suppositions and erroneous interpretations might hinder the future development of business, because this type of experience (learning) might not be applicable in different contexts (Hånell, Rovira & Mattsson, 2021; Kim & Senge, 1994; Kim, Kim & Miner, 2009; Perks & Hughes, 2008), As it might also lead to erroneous analysis in their respective markets and even business failure (Miller, 2012). An individual in the workplace might believe they possess experience, and therefore confidence in their ability, when in actuality, they do not possess the adequate knowledge, because the experiential knowledge was not codified or was improperly codified (Maula, Heimeriks & Keil, 2023).

The origin of the "superstitious" term refers to the works Skinner (1948) that defined the "superstitious behavior" and the "superstitious response" with basis on the finding of his experiments on reinforced learning; meaning, it has no relation with superstition on the colloquial sense like fortune or bad luck.

The risk of erroneous interpretation of the relation between cause and effect, are portrayed as seen in the example extracted from Henningsson (2015), where the company Trelleborg applied a system integration routine, confident in their positive Past experience, but the incorrect interpretation between cause and effect, resulted in the need of a revision in the strategy of integration, additional costs and a delay in expected results. Another example highlighted by Hånell et al. (2021), In which managers with ample aggregate experience in big multinational companies, replicated the same model of internationalization in mid-to-small sized companies, without taking into consideration the contextual differences, resulting in below expectation sales and over-investment.

In the same manner, a physician might believe a specific intervention was effective for a patient, since their condition progressed favorably, but in actuality, that change could have occurred due to a myriad of factors, for example the natural recovery of the patient or the intervention of other health professionals (Rudolph & Morrison, 2008). The doctor, by associating the patient's recovery exclusively to their intervention, might repeat that same practice in the future, believing that it is effective even if the causal relation is untrue.

Another example is that of leaders motivated by previous successes implemented agile practices *scrum* that resulted in the dissatisfaction of under the leadership that reported that the new practices were barriers to innovation (Annosi, Martini, Brunetta & Marchegiani, 2020).

A individual or a company increases competency as it increases its comprehension between causal relation of its decisions/actions and performance (Zollo, 2009). When the learning experience is valid, the new knowledge might be used for comprehension, forecast and control, although discerning the validity of new knowledge is not easy as disinformation is hidden in a sample of "data" to appear as valid (Rerup & Spencer, 2024). However, the question remains of how to know if a learning experience or general experience that a person might use is the result of superstition learning? We have no way of answering that question a priori (only posteriori when a failure is identified and there is reflection on the events). But we can make headways into this subject, by identifying the factors that might increase the propensity of the occurrence of superstitious learning, which is what was done in this paper.

Superstitious learning, although an observable phenomenon in different contexts, has not been widely investigated nor documented. This study aims to fill that gap, providing a

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theoretical and empirical basis to stimulate future research, and discussion on the mechanisms and its implications. Hence, the goal of this paper was to operationalize PSL as a tridimensional construct: overconfidence, lack of reflection and late and ambiguous feedback, having dependable variables being complaints, reworks, and errors at the workplace. For that PSL was operationalized and validated through structural equations and modeling.

2 Theoretical framework

On this section the superstitious learning constructs are defined as well as the propensity for superstitious learning, likewise its dimensions: overconfidence, lack of reflection and late and ambiguous feedback.

2.1. Superstitious learning

This type of learning is sustained by routine behaviors on the basis of incomplete or incorrect causal relationships (Heimeriks, 2010). There are countless opportunities for such misunderstandings in learning from experiences in enterprises (Levitt & March, 1988).

In workplace environments where performance measurement is complex, and there is difficulty in identifying causal relation between actions and results, it may lead managers to utilize their accumulated experience as measure of competency (Zollo, 2009). These imprecise suppositions might harm business development, since they might not necessarily be applicable in different contexts (Perks & Hughes, 2008), besides, it being a barrier for improvements, basing erroneously in success of previous actions, therefore, overconfidence perpetuates inefficient practices, resulting in superstitious learning (Zollo, 2009).

In periods of high performance or low goals, only extremely inefficient practices result in operational failure (Levitt & March, 1988). Therefore, if there is no strong negative feedback of Past experiences, the fact of "having already done that" multiple times in the past might be enough to claim the achievement of a superior level of competency (Zollo, 2009; Zollo & Reuer, 2010). Going forward we will portray the factors that increase the propensity of superstitious learning (PSL), and it will be used as formative indicators (causal) of (Bollen & Bauldry, 2011).

2.2. Factors that promote the propensity for superstitious learning

In this section the constructs behind overconfidence, lack of reflection and late and ambiguous feedback are defined, and the hypotheses are justified.

2.2.1. Overconfidence

Tendency to "overestimate the probability of being right" (Ahmad, Shah & Abbass, 2020; Carolis & Patrick, 2006). Overconfidence between individuals that, objectively, know less then a specialist is a manifestation by what is called by psychologists as "meta-ignorance" – in other words, ignorance about their own ignorance (Benegal & Motta, 2023; Dunning, 2011). Past success might increase overconfidence, as individuals tend to associate success to skill and failure to luck, what reinforces the possibility of inadequate practices being reapplied in new business ventures (Heimeriks, 2010).

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However, overconfidence is a highly engrained trait in human nature, trying to abate it is a challenging task, but, via the clearest possible feedback, it is possible to contribute to updates in procedure (Rudolph & Morrison, 2008), because, specialists tend to present little to none of the overconfidence effect, when interconnected with professionals with extremally frequent and precise performance feedback (Zollo, 2009). Thus, overconfidence might contribute to the propensity of superstitious learning and will be considered as one of its dimensions.

2.2.2. Lack of reflection

A lack of reflection, when there is a convincing but incorrect subjective experience, given a lack of sensibility in the success evaluation in relation to a set of given actions in organizational hierarchical contexts (Levitt & March, 1988), might lead to superstitious learning. A example of the importance of reflection in the reduction of risk in superstitious learning, is the process of the replication and imitation of practices done by other institutions, it is not enough to simply have access to a instruction manual to transfer over these practices (Szulansk, 1996), its necessary to refine your comprehension of the performance results (Zollo & Singh, 2004).

Doing reflections about the past updates premature conclusions, systematically analyzes time ands its linkage, contributing to the understanding of challenges, and shapes organizational practices (Hu, Zhang, Lount & Tepper, 2024; Lee & Tan, 2023; Berends & Antonacopoulou, 2014). Therefore, lack of reflection might contribute to the propensity of superstitious learning, being considered the second dimension of PSL.

2.2.3. Late or ambiguous Feedback

Because overconfidence is a highly engrained trait in human nature, for that factor to not contribute to the propensity of superstitious learning an alternative is to provide clear and frequent feedback. Sterman (1989) presented substantial experimental proof of "misconceptions in feedback", that suggests the decision makers consistently poorly realize the consequences of their own actions in situations of significant delays in one or more feedback cycles.

Feedback is a valuable tool of communication in practice both in providing information to clients, as well in communication with other professionals about work and more specific professional matters (Hofmann, Seljan & Dunder, 2024), the objective being finding forms to communicate errors and poor performance and discourage negative behavior (Andiola & Bedard, 2018).

Late feedback is a feedback of an evaluation, or result of an action or decision that occurs after a significant period of time since the event occurred, and that might limit its efficacy and its possibility of adjusting behavior or strategies in time, in the medical area a feedback that is late or inconsistent on the quality or precision of its diagnosis makes it more difficult to improve skills and problem resolution in the long term (Rudolph & Morrison, 2008). Delays in feedback complicate knowledge accumulation by intermediary actions like evaluations on continuity/interruption, revision of goals and criteria (Van De Ven & Polley, 1992), besides the difficulty to attribute credit to specific actions of the observed result (Denrell, Fang & Levinthal, 2004).

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When the feedback presents a vague or unclear answer that does not provide specific information on performance hampering comprehension on what was done well or was done poorly, we define it as ambiguous feedback. It is characterized by performance metrics that are weakly correlated in the long term, it arises from non-clear evaluations over time that demonstrate being open to multiple interpretations which is understood as a lack of information (Joseph & Gaba, 2015). Ambiguous feedback might promote divergent opinions withing a company which might impact the process of problem resolution, feeding a debate on the best course of action in relation to the feedback (Szulansk & Rerup, 2020; Denis et al., 2011), which might limit the company's capacity for channeling financial resources and the teams attention for potential solutions in a coordinated fashion (Rerup, 2009). Institutional actors with a limited volume of information have a tendency towards data misinterpretation increasing the risk of making inadequate decisions and adopting inefficient strategies (Pozner, Stimmler &Hirsch, 2010). However immediate and direct feedback might be a way to mitigate the causal ambiguity, as it simplifies mapping of causal chains and facilitates challenging and refining central suppositions (Ambrosini & Bowman, 2005). Therefore, a late or ambiguous feedback might contribute to a propensity in superstitious learning and will be used as the third dimension of PSL.

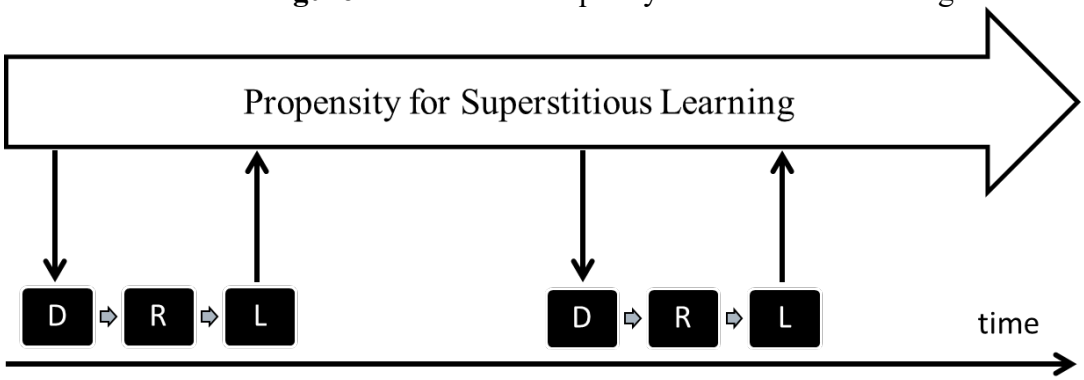
2.3. Research hypothesis

One can reach the conclusion that superstitious learning has occurred via an analysis of the causes of a failure, but how can one identify the existence of the propensity for superstitious learning (PSL) if there is no failure analysis (low or absent reflection)?

From this question the authors debated what the potential antecedents and consequents of PSL would be, in such a way to propose a model that allows the validity of a criteria or nomological validity of the operationalized construct (PSL as a formative model).

Figure 1 attempts to illustrate that debate including time: (i) from PSL which might generate decisions with low or no reflection [D], (ii) those that will have a positive or negative result [R], (iii) what might be attributed to luck/circumstances, respectively not generating learning or generating learning with low or no reflection [A], in other word with a good chance to be superstitious (PSL).

Figure 1. PSL and low-quality decisions and learning



Source: Own elaboration

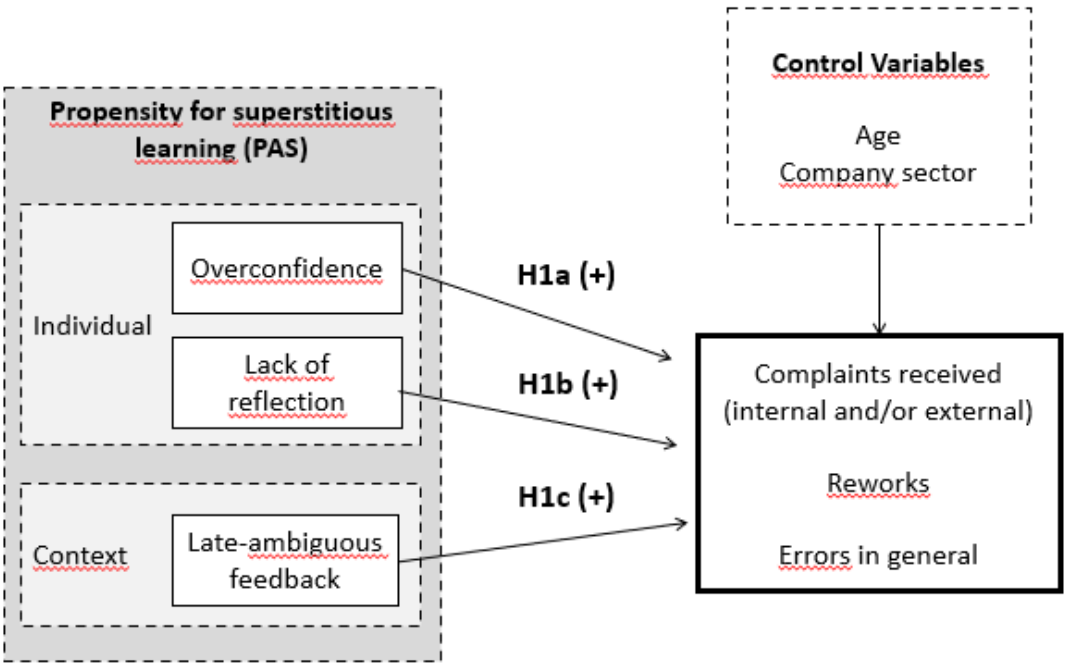
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Legend: D = Decision with little or no reflection. R = result obtained (can be positive or negative). L = Learning with little or no reflection.

If the decision and learning occur without any major reflections it would be unfeasible to search for these constructs via survey, because these were not activities that impacted the respondent in a way that he could recall as answer to the survey. Thus, we proposed a hypothesis that occurrence of complaints, reworks and mistakes would be correlated with an increase in PSL. These results, even if no reflection had occurred a priori or posteriori are easily recalled and have a high likelihood of occurring precisely because of PSL, or at least in part because of it.

The structural model detailed in Figure 2 was proposed into versions: on version "2a" the four dimension are connected directly to the dependent variable, on version "2b" the four dimension were aggregated to form a score for PSL that is used as a predictor of the dependent variable.

Figure 2. Structural model



Note 1: Lack of reflection was measured as a reflexive second order construct, having like self-reflection and external reflection after having their answers reverted to make it coherent with the definition of the construct (lack of reflection)

3. Research methodology

The methodological procedures adopted were quantitative research and data analysis via the SmartPLS 4 software. The data gathering instrument (Appendix A), used a frequency scale of seven point with (1 = never and 7 = always) for the evaluation of items, the survey was entirely composed of 20 objective questions, plus 5 items referring to control variables were

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implemented for the comprehension of the characteristics of the population that took place in the research, with those being: Working situation, age group, area of operation, experience in the field and hierarchical level. Still in the instrument of data gathering where included 8 more questions about frequency of reworks, complaints, and errors.

The overconfidence construct was measured via an adapted scale with 3 items based on Ahmad et al. (2020) paper. Lack of reflection was measured from the inversion of answers of the self-reflection in the workplace scale, with 3 items of external reflection in the workplace, with 3 items developed by Serenko (2024). The scale with 8 items for late and ambiguous feedback measurement was elaborated by the authors with basis on the theoretical framework, aiming to guarantee the validity of the content. The definition of the late and ambiguous feedback construct validation was done by six specialists (4 doctored professors and 2 doctoral candidates), and all of its definitions passed by small adjustments in a way to make it more clear for the research's target audience, as well as allowing the creation of items with content clarity and validity for next step (DeVellis & Thorpe, 2022).

The foreign scales were translated following recommended procedures (2 translators), and a scale verification was also realized, if the Portuguese versions were adequate in application or if they caused any doubts while filling out the forms.

Professionals with 5 or more years of experience acting in managerial positions were sought after for the data gathering: Managers, specialists, or entrepreneurs. The data gathering process occurred between the 14 and the 23 of June 2024, via Microsoft Forms and distributed mainly through LinkedIn and Facebook totaling 173 valid responses.

4. Results

In relation to the results of Table 1, it is worth highlighting the equilibrium between formal employment (CLT regime) and other forms of hiring (54% x 46%), with 63% of participants in the data gathering having 40 years of more (a mature public or one with an extensive background). More than 65% of participants were managers, company owners, or specialists/consultants, and 70% of participants possess more than 5 years of experience in the role they operate in, therefore we can consider the sample participating in the research has a relevant professional experience to contribute to the study.

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Table 1. Descriptive statistics of respondents

I am currently a professional	n
Hired under CLT regime	94
Self-employed	30
Legal Entity	26
Other	23
Grand total	173

Position within the hierarchy	n
Employee / Team Member	50
Consultant / Specialist	31
Business owner	34
Manager / Command position	49
Others	9
Grand total	173

Areas of activity	n
Customer service	4
Consultancy	5
Information Technology	8
Architect / Engineering	10
Education	18
Aesthetics and Health	23
Commercial	24
Adm. / Finance	57
Others	24
Grand total	173

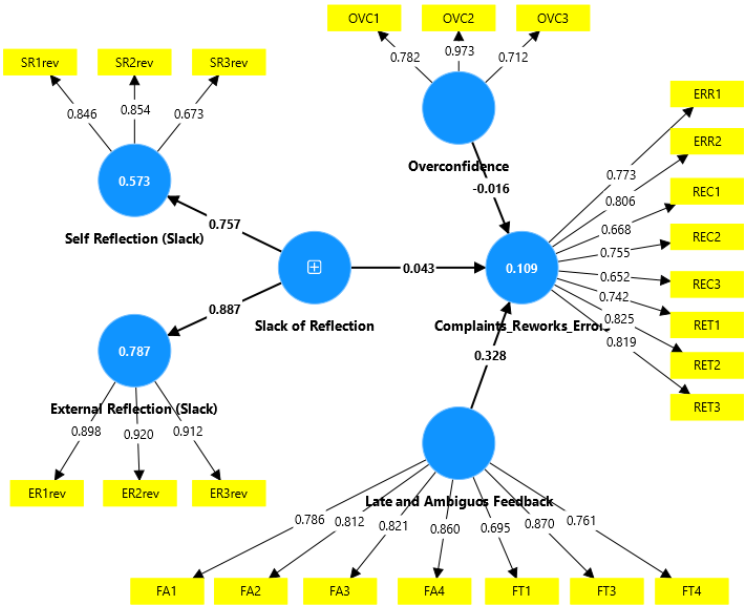
Time working in this area	n
up to 2 years of experience	23
3 to 5 years of experience	31
6 to 10 years of experience	31
11 to 15 years of experience	31
16 to 20 years of experience	24
Over 20 years of experience	33
Grand total	173

Age range	n
From 20 to 29 years old	22
From 30 to 39 years old	42
From 40 to 49 years old	58
from 50 to 59 years old	38
60 years or older	13
Grand total	173

Source: Own elaboration (n=173)

Figure 3 presents the structural Model and it is measured in a 2ª order factor the measurement model was evaluated in relation to convergent validity (significant factorial loads over 0.7 and average variance over 0.5), discriminant validity on par with latent variables on par with the items (smaller cross loads then factorial loads) and reliability measured by compound reliability following the criteria recommended by (Hair Jr, Hult, Ringle & Sarstedt, 2022)

Figure 3. Estimated structural model.



Source: Own elaboration (n=173)
Note: The control variables were not significant, so they were not kept in the model.

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To evaluate the measurement model, two rounds were performed using SmartPLS 4®, one of the most complete software programs for partial least squares structural equation modeling (PLS-SEM).

After the full execution of the complete model (Figure 3), it was identified that item "FT2rev" presented a non-significant load being therefore excluded on the second round. Also, correlation between latent variables late feedback and ambiguous feedback was very high (0.828) indicating the lack of discriminant validity between them, as such they were cojoined into a single variable in the next round. These two modifications were sufficient to meet the validity and reliability criteria (Table 2): Cronbach alpha and compound reliability was superior to 0.7 AVE (average variance extracted) was superior to 0.5, and the square root of AVE was higher than the correlation of the latent variables (Hair Jr et al., 2022).

As the validity of LV was superior to the recommended minimal (3 to 5 items/Latent Variable) and only one item was excluded it is understood that there was no capitalization by happenstance (Hair Jr., Anderson, Tatham & Black, 2009).

Table 2 – Discriminant validity at the latent variable level

Panel a - Correlations between latent variables	**1**	**2**	**3**	**4**	**5**
1 - External reflection (lack)	**0.910**				
2 - Ambiguous-late feedback	-0.125	**0.803**			
3 - Self-reflection (lack)	0.887	-0.071	**0.757**		
4 - Overconfidence	-0.294	-0.027	-0.115	**0.830**	
5- Complaints Reworks Errors	0.029	0.326	0.024	-0.037	**0.758**
Composite reliability	0.935	0.927	0.836	0.867	0.915
Average Variance Extracted (AVE)	0.828	0.644	0.633	0.688	0.574

Source: Own elaboration (n=173)
Legend: The correlation line marked in light blue indicates the correlations with the dependent variable. The bold diagonal in the correlation matrix contains the square root of the average variance extracted.
Note: Since the values on the diagonal are greater than the values off the diagonal, there is discriminant validity.

It was possible to observe factorial loads (highlighted in bold on Table 3) being higher loads than cross loads which confirms the validity of the discriminant (Bido & Silva, 2019).

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Table 3 – Discriminant validity at the indicator level

Panel b - Cross loads	1	2	3	4	5
ER1rev	**0.898**	-0.076	0.345	-0.336	0.060
ER1rev	**0.898**	-0.076	0.345	-0.336	0.060
ER2rev	**0.920**	-0.144	0.336	-0.158	0.027
ER2rev	**0.920**	-0.144	0.336	-0.158	0.027
ER3rev	**0.912**	-0.121	0.330	-0.311	-0.009
ER3rev	**0.912**	-0.121	0.330	-0.311	-0.009
FA1	-0.077	**0.786**	0.120	0.019	0.299
FA2	-0.077	**0.812**	-0.001	-0.052	0.266
FA3	-0.123	**0.821**	-0.050	0.014	0.235
FA4	-0.049	**0.860**	0.039	-0.081	0.244
FT1	-0.133	**0.695**	-0.018	-0.017	0.197
FT3	-0.109	**0.870**	0.034	-0.016	0.336
FT4	-0.159	**0.761**	0.033	-0.028	0.205
SR1rev	0.284	-0.003	**0.846**	-0.149	0.031
SR1rev	0.284	-0.003	**0.846**	-0.149	0.031
SR2rev	0.238	0.068	**0.854**	-0.013	0.008
SR2rev	0.238	0.068	**0.854**	-0.013	0.008
SR3rev	0.358	0.016	**0.673**	-0.109	-0.023
SR3rev	0.358	0.016	**0.673**	-0.109	-0.023
OVC1	-0.289	-0.054	-0.168	**0.782**	-0.013
OVC2	-0.259	-0.035	-0.073	**0.973**	-0.044
OVC3	-0.266	0.092	-0.172	**0.712**	-0.007
ERR1	-0.051	0.257	0.012	-0.010	**0.773**
ERR2	0.002	0.204	-0.055	0.072	**0.806**
COMP1	0.060	0.240	0.068	-0.016	**0.668**
COMP2	0.023	0.225	-0.058	-0.121	**0.755**
COMP3	-0.030	0.199	-0.041	0.006	**0.652**
REW1	0.098	0.225	0.026	-0.044	**0.742**
REW2	0.049	0.271	-0.028	-0.041	**0.825**
REW3	0.011	0.315	0.077	-0.044	**0.819**

Source: Own elaboration (n=173)
Legend: The values in bold are the factor loadings (all are significant at the 5% level) and the remaining values are the cross loadings.
Note: Since the factor loadings are greater than the cross loadings, there is discriminant validity at the indicator level

Table 4 presents the final structural model where adjusted R^2 evaluated the portion of the variance of the endogenous variable which is explained by the structural model (Ringle,

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Silva, & Bido, 2014). For the social and behavioral sciences, Cohen (1988) suggest that a R^2=2% should be classified as a small effect, R^2=13% as a medium effect and R^2=26% as a large effect. Following this model, we can affirm that the hypothesis, H1c(+): Late-ambiguous feedback presented a small to medium effect.

Table 4. Assessment of the structural model (hypotheses)

Structural relations	Hypothesis	Structural coefficient	Effect size (f^2)	p-value	R^2 adj.
Overconfidence -> Complaints Reworks Errors	**H1a(+)**	-0.016	0.000	0.870	
Lack of reflection -> Complaints Reworks Errors	**H1b(+)**	0.043	0.002	0.534	0.093
Late-ambiguous feedback -> Complaints Reworks Errors	**H1c(+)**	0.328	0.120	0.000	

Source: Own elaboration (n=173)
Note: p-value estimated by bootstrap with 10,000 repetitions, and the control variables were not significant, so they were not kept in the model. Since VIF < 1.1, multicollinearity is not a problem in this model.

5. Discussion

The main goal of this article was to operationalize the propensity of superstitious learning (PSL) as tridimensional construct: Overconfidence, lack of confidence, and late and ambiguous feedback, with its dependent variables being complaints, reworks, and errors in the workplace.

After conjoining the latent variable late feedback with ambiguous feedback, we arrived at a model with convergent validity, discriminant validity, and adequate reliability. Only the H1c(+) hypothesis was supported by the data (late-ambiguous feedback, $\beta = 0.328$; $p<0.01$) showing a significant effect, confirming the literature on the subject, which highlights that late or ambiguous feedback chains a vicious reinforcement cycle that amplifies managers confidence erroneously, which compromises the reach of robust learning and improvement in problem resolution (Rudolph & Morrison, 2008), on the other hand a feedback model that presents the correct solution after the execution of a task might facilitate learning from failure (Storey, 2000; PSLhler, Cepeda, Wixted & Rohrer, 2005). Therefore, an organization that promotes awareness of errors creates a high level of communication about mistakes, and makes it so members know to learn and react to these occurrences (Oliveira et al., 2023). Since learning with the experience of failures and errors and converting them into preventable measures avoids reoccurrence and improves performance. (Storey e Barnett, 2000; Wilhelm, Richter & Semrau, 2019; Zhang, Liao, Liang & Chan, 2024).

The non confirmation of both hypothesis (H1a: Overconfidence → complaints, reworks, errors | H1b: Lack of reflection → complaints, reworks, errors) is also an interesting result, as it might lead to reflection on the dimensions of PSL.

A view would be that when evaluating feedback (late or ambiguous), the respondent might have a more objective opinion, as they might recall how many times, recently, had to handle those sorts of issues as in their field this might be a reoccurring phenomenon. Another view would be that overconfidence and lack of reflection require a subjective self-evaluation effort that might have been seldom done by the respondent.

Beyond that its probable that the relations that were tested in this research were measured by other constructs, for example: (i) the late or ambiguous feedback might generate

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failures in the production process which might lead to complaints, reworks and future errors; (ii) overconfidence and lack of reflection might lead to lower quality decisions, which might lead to complaints and reworks. As such we suggest further research so that the dependent variable is related to individual performance in the workplace and less related to teamwork or other contextual variables.

Another plausible explanation is that attribution of blame in feedback (late or ambiguous), is done to others, while overconfidence and lack of reflection is self assigned. As such in the first case there would be a discussion on the potential causes while in the second case discussion could be avoided disabling identification of overconfidence and lack of reflection as primary causes. Therefore, in future research the inclusion of the concept of psychological safety (Edmondson & Bransby, 2023) as a moderating variable might bring further clarity to these relations.

6. Conclusions

This paper had the objective to deepen comprehension on the propensity to superstitious learning (PSL) construct by means of operationalizing the tridimensional construct which presented convergent validity, discriminant validity, and adequate reliability for each dimension, although these dimensions did not present criteria validity as complaints, reworks, and errors in the workplace predictors.

This scientific paper presents advancements in relation to superstitious learning theory, such as: Development in the scale of late and/or ambiguous feedback measurement, and for measurement of lack of reflection the scales for self-reflection and external reflection were inverted, however as criteria validity was not guaranteed on this research, it is still necessary for further research to include antecedents and consequents of PSL, after that it might be possible for the creation of a PSL indices, which would be very interesting, as it might serve as a warning for decision-makers and organizations for moments where one should invest more time in reflection (for decisions before and after results, whether they be positive or negative).

Learning in organizations occurs in every level (individual, group, organization, and interorganizational) as such, we can think of the continuity of research from the revision of scale items to make it more adequate for analysis. Beyond what was done in this research we understand that warning people and organizations on the importance of reflection even if the results are positive is one of the contributions of this work in regard to preventing superstitious learning and low-quality decision making.

From a theoretical point of view the results reinforce that organizational learning must not be comprehended as just a cumulative process of successful experiences, but as a phenomenon that is susceptible to interpretation. By highlighting PSL relevancy, the study contributes to integration in the learning process perspectives of an individual in organizations and managerial decision making, highlighting the role actors and organizations in causal attribution and possibly inefficient routine consolidation. On what is pertinent to the practical implications the results suggest that development mechanisms that stimulate reflection might benefit organizations, fomenting systematic revision of past decisions the importance of feedback, reducing the probability of reinforcement of misunderstandings. Such initiatives might favor more robust learning processes and decisions more aliened with performance in the long term.

For future studies it is recommended the reapplication and refinement of the PSL construct in organization contexts, sectors, and cultures, as well as an investigation on the

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effects of variability of performance, innovation, organizational adaptation, and business failure. Longitudinal studies might contribute to understanding if propensity for superstitious learning is consolidated or is corrected in the long-term.

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Appendix A- Data gathering instrument

I would first like to thank your collaboration with this work. Anonymity is guaranteed (You do not need to identify yourself) and datapoints will be analyzed in aggregate form, without being able to identify individual responses. The estimated time to fill in the form will be 10 minutes. If possible, I would like the courtesy to forward this form to potential participants that fall into this study's criteria: Professionals with 5 years or more in professional experience working as (Managers, Specialists, or entrepreneurs). To answer this form, please consider the works or projects of your last 2 years that were important for business, but even after all the effort did not bring the expected results.

1. Currently I am

_ Formally employed in a company (CLT regime)

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_ Freelancer
_ Independent Contractor (Legal Entity)
_ Other

2. I am currently in-between:
_ 20 to 29 years old
_ 30 to 39 years old
_ 40 to 49 years old
_ 50 to 59 years old 60 years old or older

3. I currently work in this area:

4. My position within the hierarchy:
_Employee/Staff member
_Consultant/Specialist
_Company Owner
_Manager/Leadership Other

5. By working in this area, I have:
_ up to 2 years of experience 3 to 5 years of experience
_ 6 to 10 years of experience
_ 11 to 15 years of experience
_ 16 to 20 years of experience More than 20 years of experience

On a scale from 1 to 7 with 1 being never and 7 being always. In my workplace...

6 I analyzed my on experiences related to work to understand my inner-state and better my functionality capacity.
7 I have tried to understand my inner self to avoid future mistakes.
8 I have analyzed Past mistakes and have learned from them.
9 I have explored, analyzed, and evaluated Past experiences in relation to work of my colleagues.
10 I have observed behavior of my colleagues and have learned from it.
11 I have analyzed the mistakes of my colleagues to not repeat them in the future.
12 I have believed that my abilities and knowledge could have surpassed my competitors
13 I have trusted in my capacity to do better than others in decision-making.
14 I have felt more confident in my own opinions and decision making than that of my colleagues and friends.

On a scale from 1 to 7 with 1 being never and 7 being always. In my workplace...

15 the actions of my competitors are unpredictable.
16 the means of production/service change in a frequent and significant fashion.

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17 the demand and preferences of consumers are almost unpredictable.

On a scale from 1 to 7 with 1 being never and 7 being always. In my workplace...

18 the feedback that I receive about my decisions is confusing.
19 it takes a while to receive an answer on the result, whether good or bad of a decision taking by me.
20 I can keep track of the results of my decisions.
21 the feedback that I receive on my decisions is contradictory.
22 I feel that it is often difficult to interpret the results of my actions in a clear way.
23 general performance is harmed by delays in feedback return.
24 I find it difficult to understand exactly what I need to improve from the feedback I receive.
25 Delays to feedback handicaps my capacity to improve my abilities.

On a scale from 1 to 7 being 1-Never, 2- Only a couple of times, 3- Once per month, 4- At least once per week, 5- More than three times per week, 6- Almost every day, 7- More than once per day. Still considering the projects you were a part of in the last 2 years that did not bring results.

26 Complaints on behalf of your suppliers
27 Complaints on behalf of your employees
28 Complaints on behalf of your clients
29 Reworks that were incurred by my own responsibility
30 Reworks that were incurred by other people in the project
31 Reworks that were incurred by a failure in communication
32 All in all, mistakes that were my responsibility
33 All in all, mistakes that were the responsibility of others

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