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► To cite this version:

Laurent Cosnefroy, Fabien Fenouillet, Corinne Mazé, Barbara Bonnefoy. On the relationship between the forethought phase of self-regulated learning and self-regulation failure. *Issues in Educational Research*, 2018, 28. hal-02340652

HAL Id: hal-02340652

<https://hal.science/hal-02340652v1>

Submitted on 30 Oct 2019

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On the relationship between the forethought phase of self-regulated learning and self-regulation failure

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In order to extend previous research on procrastination as a cause of performance failure due to faulty self-regulation, we developed a model of self-regulated learning failure and tested it in two separate studies ($N_1 = 378$, $N_2 = 315$). The relationships between procrastination, disorganisation, the forethought phase of self-regulated learning (SRL), academic performance and self-regulation failure are addressed. Self-report scales were used to assess procrastination, disorganisation, and forethought. Three hypotheses about the relationships between these dimensions were tested. The first is that disorganisation and procrastination are two distinct constructs; it is argued that they represent two routes via which self-regulation failure can be manifested. The second is that disorganisation and procrastination have a negative impact on academic performance; the results obtained showed that only disorganisation had a negative impact on academic performance. The third is that the implementation of high-quality processes during the forethought phase is a safeguard against disorganisation and procrastination.

Introduction

Self-regulated learning (SRL) refers to processes that learners use to activate and maintain cognitions, emotions, and behaviours to attain personal goals (Zimmerman & Kitsantas, 2014). Research on self-regulated learning has provided insight into how learners control the learning process, take initiatives, persevere, and adapt in order to succeed and learn efficiently (Pintrich, 2003; Winne, 1995; Zimmerman, 2013). It is important to understand how self-regulation failure is manifested and what its causes are if we want to help learners improve the processes involved in SRL. Self-regulation fails when a person tries to modify or inhibit a specific response, but does not manage to do so because the effort exerted is insufficient (under-regulation) or because the effort is inefficient or counterproductive (misregulation) (Baumeister & Heatherton, 1996). The purpose of the present article is to gain further insight into the concept of self-regulated learning failure. Based on the multidimensional nature of SRL, two distinct forms of SRL failure are proposed here: procrastination, which reflects deficient control of effort, and disorganisation, a more specifically cognitive form that reflects inefficient information processing (Entwistle, 1988).

Theoretical framework

Procrastination as a form of SRL failure

It has become widely accepted that procrastination can be conceptualised as a form of self-regulation failure (Howell & Watson, 2007; Steel, 2007; Wolters, Won & Hussain, 2017). Procrastination is defined as the delay of the initiation or completion of a goal to the point of discomfort (Krause & Freund, 2016). Procrastination has been studied on the basis of various theoretical frameworks, some of which place priority on the personality traits associated with it, others that emphasise the weight of contextual factors (Steel, 2007). Seeing procrastination as a form of self-regulation failure aligns with the latter approach insofar as the SRL models developed in this framework underline the role played by the individual's perceptions of the learning environment. This view involves demonstrating that procrastination can be predicted from the key variables of SRL models. A question raised is whether the traits that allow learners to regulate themselves to be motivated, strategic, and autonomous, are the very same traits that are lacking in those who are inclined to procrastinate (Klassen, Krawchuk & Rajani, 2008, Wolters, 2003a). To show this, two variables have been widely studied, achievement goals and self-efficacy. Achievement goals refer to the pursuit of competence in achievement situations. Competence may be defined according to whether one has developed one's skills or knowledge (mastery goals), or attained greater skills or knowledge than others (performance goals). Moreover, an achievement goal may be focused on attaining a desirable possibility (an approach goal), or may be focused on avoiding an undesirable possibility (an avoidance goal) (Elliot & Trash, 2000; Pintrich, 2000).

Given that an approach-related goal orientation tends to be associated with adaptive self-regulatory processes, whereas an avoidance-related goal orientation tends to be associated with maladaptive self-regulatory processes, procrastination should be more closely tied to the latter than to the former (Howell & Buro, 2009). The studies conducted so far have shown that performance-avoidance goals (trying to avoid looking stupid or incompetent) are significant positive predictors of procrastination (McGregor & Elliot, 2002; Seo, 2009; Strunk, Cho, Steele & Bridges, 2013), as well as mastery-avoidance goals (trying not to leave the task unmastered) (Corkin, Yu & Lindt, 2011; Howell & Buro, 2009; Howell & Watson, 2007). Mastery-approach goals (trying to learn and understand), were found to be significant negative predictors of procrastination in the studies by Corkin, Yu and Lindt (2011), Howell and Buro (2009), Howell and Watson (2007), and Ganesan, Mamat, Mellor, Rizutto & Kolar (2014). Performance-approach goals (trying to outperform others) were significant negative predictors in Strunk et al. (2013) but positive ones in Wolters (2003a).

In an academic context, self-efficacy beliefs can be defined as the judgments that individuals make about their ability to learn or perform academic tasks. Insofar as a high feeling of self-efficacy favors persistence in the learning process, self-efficacy beliefs and their sustainment throughout the learning process play a critical role in SRL models (Pajares & Usher, 2012; Zimmerman, 2000). If procrastination is a form of SRL failure, then it should be inversely proportional to self-efficacy. In the meta-analyses by van Eerde

(2003) and Steel (2007), the mean correlations between procrastination and self-efficacy were $-.44$ and $-.38$, respectively. These results are compatible with the hypothesis of procrastination as a form of self-regulation failure. As expected, self-efficacy was found to be negatively associated with procrastination, approach goals were negative determinants of procrastination, and avoidance goals were positive determinants of procrastination. Some studies, however, have obtained different results on the relationship between achievement goals and procrastination (Ganesan et al., 2014; Strunk et al., 2013; Wolters, 2003a). Further research is needed on this topic.

Disorganisation as another manifestation of SRL failure

Given that self-regulation results from the coordination of various different processes, self-regulation failure is not likely to have a single cause but may be due to various different causal sequences (Baumeister & Heatherton, 1996). SRL requires implementing learning strategies that guide and improve information processing. These include cognitive strategies — such as organising and transforming, rehearsing and memorising, and reviewing records — and metacognitive strategies for planning, monitoring one's progress, and controlling one's cognition (Boekaerts, 1996; Garcia & Pintrich, 1994; Zimmerman, 2013). Metacognitive monitoring refers to the subjective assessment of one's own cognitive processes and knowledge, whereas control refers to the processes that regulate cognitive processes and behaviour (Koriat, Ma'ayan & Nussinson, 2006). Active regulation of motivation has been described as another component of SRL. Regulating motivation "encompasses those thoughts, actions, or behaviors through which students act to influence their choice, effort, or persistence for academic tasks" (Wolters, 2003b, p. 190). SRL necessitates two regulation systems, cognitive and motivational, which work in tandem (Boekaerts, 1996; Garcia & Pintrich, 1994; Wolters, 2003b).

Accordingly, there are two patterns of SRL failure, failure of the cognition-regulation system and failure of the motivation-regulation system. It should be possible to distinguish these two systems operationally. Difficulty initiating and pursuing action (procrastination) reflects deficient regulation of motivation, that is, of the cognitions and actions used by learners to make choices, apply effort, and persist in the performance of academic tasks (Wolters, 2003b; Wolters & Benzon, 2013). This form of self-regulation failure must be distinguished from difficulty establishing and maintaining a structured way of studying, called disorganisation by Entwistle (1988) and called undirected learning patterns by Vermunt (Vermunt & Vermetten, 2004). It prevents a well-structured approach, one that enables learners to process information effectively. The learner lacks efficient learning strategies and well-defined standards for regulating his/her actions. An example of this is a student who is unable to orient his/her activity based on the teacher's instructions: his/her goals are too general, the material is too complex, etc. The learner feels confused (which leads to omission of relevant material), powerless, and unable to decide what method to use. He/she needs help from others (Elliot, McGregor & Gable, 1999; Entwistle, 1988; Senko & Miles, 2008; Vermunt, 1998; Vermunt, Bronkhorst & Martinez-Fernandez, 2014). Since disorganisation does not have a bearing on action control but on information processing, it is thought to reflect failure to regulate cognition.

As above for procrastination, some studies — albeit fewer in number — have looked at how achievement goals affect disorganisation. When disorganisation was regressed over achievement goals, performance-avoidance goals were significant positive predictors of disorganisation (Elliot et al., 1999; Elliot & McGregor, 2001; Senko & Miles, 2008). Mastery-approach goals proved to be significant negative predictors of disorganisation (Darnon & Butera, 2005). Mastery-avoidance goals were also significant positive predictors (Darnon & Butera, 2005; Elliot & McGregor, 2001). In other studies, self-efficacy was also a significant negative predictor of disorganisation (Bandalos et al., 2003), or was inversely correlated to it ($r = -.62$, Senko & Miles, 2008). Again, like procrastination, disorganisation was negatively associated with self-efficacy, approach goals were negative determinants, and avoidance goals were positive determinants. The similarity of the patterns relating achievement goals and self-efficacy to disorganisation and procrastination support the hypothesis that disorganization is a form of SRL failure. However, the sole study (Howell & Watson, 2007) that simultaneously examined both disorganisation and procrastination found that disorganisation was a better predictor of procrastination. This raises the question of whether disorganisation and procrastination are two distinct constructs or constitute two facets of the same construct. The hypothesis of two separate routes to SRL failure rests on the idea that disorganisation and procrastination are two different constructs.

Relationships between forethought and SRL failure

Zimmerman hypothesised that self-regulation failure results from a reactive approach to self-regulation based totally on an analysis of the gap between observed performance and the standard to be attained. Proactive regulation, which begins before the performance phase, supplies learners with goals, strategical planning, and a sense of personal agency that will efficiently guide them as they progress (Zimmerman, 2000). "Proactive learners self-regulate more effectively because they engage in high-quality forethought, which in turn improves their self-regulatory functioning during subsequent phases" (Zimmerman, 2008, p. 279). If procrastination and disorganisation are two forms of SRL failure, then they should result from low-quality forethought processes. Zimmerman's (2000) sociocognitive model breaks the forethought phase down into two subcomponents: task analysis and activation of motivational beliefs.

Task analysis is then further broken down into goal setting and strategic planning. Defining suitable goals in terms of their difficulty, specificity, and proximity, is what optimally guides the student's actions and has a positive impact on motivation (Locke & Latham, 2002; Zimmerman, 2008). Closely tied to goal setting is strategic planning. Defining specific goals facilitates action planning and allocating temporal resources (Austin & Vancouver, 1996).

The second subcomponent of the forethought phase involves the activation of motivational beliefs, i.e., the feeling of self-efficacy, the value assigned to the task, and goal orientation. (Zimmerman, 2000).

Thus, it would be because they are produced by low-quality forethought processes that procrastination and disorganisation can be regarded as forms of self-regulated learning failure. Failure occurs when goal-orientation is inadequate or self-efficacy beliefs are difficult to activate, as shown earlier in studies on procrastination and disorganisation. The idea here is to extend this demonstration to include other processes at play during forethought, such as goal setting, time management and the value assigned to the task.

Consequences of SRL failure

A lack of control (under-regulation) or ineffective control (misregulation) of behaviours, thoughts, and emotions has negative consequences that lead to substantial problems in various domains (money management, various kinds of addiction, academic failure) (Heatherton & Baumeister, 1996; Zimmerman, 2000). To arrive at a convincing demonstration of the claim that procrastination and disorganisation are two distinct forms of failure in SRL, one also has to demonstrate their negative impact on academic performance. SRL failure occurs when a person does not manage to reach his/her personal goals or desired level of achievement (Pintrich, 2000; Sitzmann & Ely, 2011). This is not necessarily synonymous with academic failure. Imagine a student who wants to outperform others in a given discipline by obtaining the best grade in the class (performance-approach goal). If that student does well on his/her exams but does not get the best grade, then this is a form of self-regulation failure since the goal set was not attained. It is true nonetheless that the impact of self-regulation failure generally shows up as low academic performance. A comparison of high-achieving students and low-achieving students revealed large differences between the two groups in the self-regulation strategies they implemented, including the quality of metacognitive monitoring, maintenance of self-efficacy, goal setting and planning, the use of strategies for cognitive organisation and transformation, and help-seeking from peers (DiFrancesca, Nietfeld & Cao, 2016; Dörrenbächer & Perels, 2016; Kitsantas, 2002; Nandagopal & Ericsson, 2012). Similarly, the use of motivational regulation strategies also improved academic performance (Grunschel, Schwinger, Steinmayr & Fries, 2016).

It follows from these recurring links between self-regulation quality and academic performance that self-regulation failure will lead, on the contrary, to poor academic performance. This is why a model that sees procrastination and disorganisation as two forms of failure in self-regulated learning must test the hypothesis that both of these variables have a negative impact on academic performance. Several results make this hypothesis plausible. Bandalos et al. (2003), Elliot et al. (1999), and Senko and Miles (2008) found that disorganisation was a significant negative predictor of performance. Concerning procrastination, the meta-analyses by van Eerde (2003) and Steel (2007) pointed out rather weak negative correlations between procrastination and academic performance, respectively: $-.28$ and $-.25$ for overall grade point average (GPA). Certain more recent studies have confirmed these significant negative correlations between procrastination and academic performance (Corkin, Yu & Lindt, 2011; Klassen et al., 2008), while others have found no significant link between the two (Howell & Watson, 2007; Seo, 2011).

The present research

Based on the above considerations, it would seem that a theoretical framework based on all three of the following postulates could help enhance our understanding of SRL failure. Firstly, SRL failure will be manifested via two distinct routes, procrastination and disorganisation. Secondly, SRL failure will be determined by poor processing during the forethought phase of SRL. Thirdly, SRL failure will also be manifested as a negative effect on academic performance. The purpose of the present research was to test this model, depicted in Figure 1.

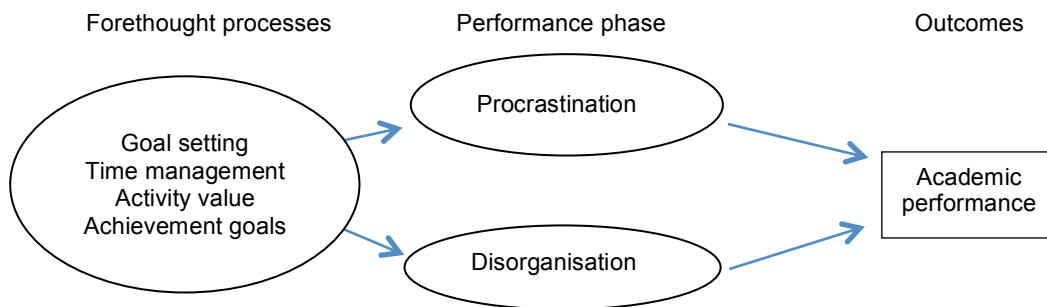


Figure 1: A self-regulated learning failure model

Two studies with French undergraduate students were conducted to test the following three hypotheses: Firstly, procrastination and disorganisation constitute two distinct constructs and not two facets of one and the same construct (Hypothesis 1). A model that treats them as such should therefore fit the data better than a model that sees them as two representatives of the same second-order factor or a model that combines them into one and the same factor. Fear of failure orients individuals toward the possibility of failure leading to performance-approach and/or performance-avoidance goal endorsement. Given that performance-approach and performance-avoidance goals translate susceptibility to the fear of failure, we can expect them to be moderately correlated with each other. Secondly, low-quality processing during the forethought phase is a determinant of disorganisation and procrastination (Hypothesis 2). Forethought processes will be measured using two self-report scales: one to measure achievement goals, the other to measure other processes activated during the forethought phase. The latter will not take into account all of the processes involved in forethought, but will focus on three tightly linked processes: goal setting, planning, and activation of motivational beliefs. Setting specific goals permits planning of how to attain those goals; activating motivational beliefs energises the learner by enhancing his/her determination to reach the goals defined. Thirdly, disorganisation and procrastination have a negative impact on academic performance in a given discipline, as measured at the end of the semester (Hypothesis 3).

Study 1 served two purposes: to test the robustness of the measurement instruments used (some of which were developed for this research), and to confirm the results obtained in earlier studies by regressing procrastination and disorganisation over achievement goals.

Study 2 was aimed at extending these results by validating the whole model presented in Figure 1.

Study 1

Method

Participants and procedure

The sample consisted of 378 French students (19% men and 81% women) in their first year of psychology at a university in the Parisian area. Their mean age was 19.63 (SD = 3.44). The experimenters contacted a number of psychology professors, who agreed to have the questionnaires passed out during their classes. Testing took place between October 2011 and January 2012. After presenting the study to the students, the experimenters distributed printed questionnaires to the students, who had about a half an hour to fill them out. All respondents first signed a consent form that met the requirements of the psychology ethics code.

Measures

For the *self-report scale*, we conducted a series of pilot studies to construct the three subscales of the questionnaire. To measure forethought and procrastination, we generated an initial pool of original items specially designed for this purpose. To measure disorganisation, the five items of the French adaptation of Elliot, McGregor and Gable's (1999) questionnaire (Darnon & Butera, 2005) were used after partial revision. The students had to respond on a Likert scale ranging from 1 (totally disagree) to 7 (totally agree). The instructions indicated that the purpose of the questionnaire was to learn more about students' study methods in general (the ones usually used to study outside of class to do homework).

The first subscale measured some processes at play during *forethought*. This dimension was measured using four items. The first three pertained to the channeling function of goals. They were worded as follows: "I set short-term goals (daily, weekly) and long-term goals (monthly, by semester)" (goal proximity); "I set ambitious goals for studying by myself" (goal difficulty); and "I think about how I'm going spread out my study time over the week" (planning associated with goal setting). The fourth item pertained to the energising function of forethought: "To help me study, I think of all the good reasons I have for doing my homework".

The second subscale measured *procrastination*, using six items designed to assess the behavioural indicators of procrastination. Three of the items were used to explore difficulty initiating an action (e.g., "It takes a lot of effort for me to start working"). The other three pertained to difficulty pursuing the action until completion (e.g., "If I take a break when I'm studying, I have a lot of trouble getting back to work").

The third subscale measured *disorganisation*. Based on Entwistle's (1988) work, Elliot, McGregor and Gable (1999) devised a disorganisation scale comprising five items. It was adapted to French and validated by Darnon and Butera (2005). We used a short form

containing only three items, since preliminary studies have shown that the psychometric qualities of two of the initial scale's items are insufficient. Two of our items were identical to those in Darnon and Butera's (2005) scale; the third was similar but formulated in a slightly different way.

To measure *achievement goals*, we used Elliot and McGregor's (2001) *Achievement Goal Questionnaire*. This scale, validated in French by Darnon and Butera (2005), has 12 items. It is a four-dimensional scale, with each dimension pertaining to a type of achievement goal: performance-approach, mastery-avoidance, mastery-approach, and performance-avoidance.

Missing-data analysis

To validate our self-report scale, the missing data (less than 2% per variable) were imputed using the expectation-maximisation procedure of the *SPSS* (version 22) statistical software package. This procedure is considered superior to other methods (Allison, 2002) such as list-wise deletion.

Results

Descriptive statistics

All of the items on the three subscales obtained a satisfactory distribution with skewness ranging from -.38 to .44 and kurtosis ranging from -1.30 to -.64.

Exploratory factor analysis (EFA)

We ran an EFA to verify the structure of the questionnaire. This approach allows one to take measurement error into account. Multiple criteria were used to determine the number of factors to extract. First, a parallel analysis was computed following the guidelines set forth by Thompson and Daniel (1996) and O'Connor (2000). Eigenvalues were extracted from random data sets that paralleled the actual dataset in terms of the number of cases and variables. The currently recommended practice is to use the values corresponding to the desired percentile (typically the 95th) of the distribution of random data eigenvalues. A comparison of the eigenvalues extracted from a random data matrix, to the values extracted from the actual data, suggested a three-factor solution, given that the eigenvalue of the fourth factor (0.82) was below the value at the 95th percentile (1.16).

In the light of our postulate that the factors are related to each other, we used oblique rotation. As Table 1 shows, all items retained had a loading above .40 on a single factor, and had no crossed loadings above .32 on any other factor. The results of the final principal component analysis (PCA) with oblique rotation accounted for 58.34% of the total variance. The first factor included the six items on the procrastination scale; the second, the four items on the forethought scale; and the third, the three items on the disorganisation scale.

Table 1: Exploratory factor analysis: Factor loadings using principal component extraction with oblique rotation (Oblimin)

	Item	Factors		
		I	II	III
V1 (PROCR)	I always back off when it's time to study.	.75		
V2 (PROCR)	Starting to study always takes a lot of effort on my part.	.80		
V3 (PROCR)	If I take a break when I'm studying, I have a lot of trouble getting back to work.	.57		
V4 (PROCR)	It's very hard for me to make a schedule for studying and then stick to it.	.63		
V5 (PROCR)	I have trouble finishing when I'm doing my homework.	.73		
V6 (PROCR)	I often get so worried thinking about all the homework I have to do that I can't seem to tackle it.	.84		
V7 (DISOR)	I often realise I don't know what I'm supposed to study or where I should start.			-.84
V8 (DISOR)	I find it very difficult to decide how to study in preparation for exams.			-.76
V9 (DISOR)	I just don't know how to go about studying for my classes.			-.81
V10 (FORE)	I set ambitious goals for doing my homework.		.71	
V11 (FORE)	I set short-term goals (daily, weekly) and long-term goals (monthly, by semester).		.76	
V12 (FORE)	To help me study, I think of all the good reasons for doing my homework.		.76	
V13 (FORE)	I think about how I'm going to spread my homework over the week.		.62	
Initial eigenvalues		4.45	1.80	1.33
% explained variance		34.26	13.88	10.21

Means and intercorrelations for procrastination, disorganisation, and forethought

As shown in Table 2, the correlation between procrastination and forethought was negative and moderately high ($r = -.38, p < .001$), whereas the correlation between procrastination and disorganisation was positive and moderately high ($r = .43, p < .001$).

Table 2: Descriptive statistics and correlations for the study variables (Study 1, N = 378)

	M	SD	Cronbach's α	1	2
1 Procrastination	4.07	1.45	.84	1	
2 Disorganisation	3.44	1.39	.75	.43***	1
3 Forethought	4.30	1.34	.71	-.38***	-.17**

Note: ** $p < .01$; *** $p < .001$

Regression of procrastination and disorganisation scores over achievement goals

The mean procrastination and disorganisation scores were regressed over the four achievement goals. The overall model was significant for procrastination: $F(4, 369) = 6.69, p < .001$ (adjusted $R^2 = .07$). Mastery-approach goals ($\beta = -.26, p < .001$) and performance-avoidance goals ($\beta = .11, p < .05$) were significant predictors of procrastination. The overall model was significant for disorganisation: $F(4, 369) = 6.00, p$

< .001 (adjusted $R^2 = .06$). Mastery-approach goals ($\beta = -.15$, $p < .05$), performance-avoidance goals ($\beta = .18$, $p < .01$), and mastery-avoidance goals ($\beta = .17$, $p < .05$) were significant predictors of disorganisation.

Brief discussion of Study 1

The EFA indicated that the questionnaire items could be grouped into three factors, corresponding to the three subscales used. The internal reliability of the subscales was satisfactory (coefficients above .70). As expected, the correlation between procrastination and disorganisation was positive and moderately high. The regression of the procrastination and disorganisation scores over the four achievement goals indicated a pattern of predictors align with the hypotheses set forth in this study.

Study 2

Study 2 was aimed at confirming the model of SRL failure depicted in Figure 1. A measure of academic performance was used to assess the effects of procrastination and disorganisation.

Method

Participants and procedure

The sample consisted of 315 French students (15% men and 85% women) in their second year of psychology at the same university as in Study 1. Their mean age was 21.38 (SD = 4.98). Students were recruited from a course in cognitive psychology. The experimenter asked the students to connect up to the university's online course system where they would find the questionnaire. The students could fill out the questionnaire any time between October 2012 and December 2012. The system made it impossible for a given student to respond twice.

Measures

We used the same scales as in Study 1. At the end of the semester, all but 12 of the students were evaluated on a 20-point multiple-choice test (same for all students).

Results

Confirmatory factor analysis (CFA) and model comparison

As in Study 1, missing data (less than 3.5%) were imputed using the expectation-maximisation procedure of *SPSS* (Version 22). For the confirmatory factor analyses, we used *MPLUS* version 7.31 software (Muthén & Muthén, 1998-2015). The recommended two-index strategies were used to assess fit, with values greater than .95 for CFI and TLI (Hu & Bentler, 1999) and greater than .90 as an acceptable value. SRMR and RMSEA values less than .08 were taken to indicate an adequate fit (Browne & Cudeck, 1993; Hu & Bentler, 1999). Given that the χ^2 statistic is quite sensitive to sample size (Hu & Bentler, 1995), we relied more heavily on CFI, TLI, and SRMR.

In line with the results of our exploratory analyses, we tested a model (Model A) with three intercorrelated factors: forethought (FORE), procrastination (PROCR), and disorganisation (DISOR). We also tested a four-factor model (Model B), which postulates that procrastination (PROCR) and disorganisation (DISOR) are two facets of one and the same factor, which would be a second-order factor. Lastly, we tested a third, two-factor model (Model C) in which the procrastination (PROCR) and disorganisation (DISOR) items were assigned to a single factor.

Table 3: Values of the fit indexes for the three models being compared

Model	χ^2	df	RMSEA	CFI	TLI	SRMR	AIC	BIC
A	137.83	62	.05	.95	.94	.05	14296.12	14453.72
B	159.54	64	.07	.94	.93	.07	14313.83	14463.93
C	344.71	64	.12	.82	.79	.08	14498.99	14649.10

As we can see in Table 3, the fit indexes all argue in favor of Model A. χ^2 is lower than for the other two models, as are RMSEA, SRMR, AIC, and BIC. Conversely, CFI and TLI are the highest for Model A. This three-factor model fits the data well ($\chi^2(62) = 137.83, p < .001; RMSEA = .06; 90\% .05-.08; CFI = .95; TLI = .94; SRMR = .05$), with each item loading onto the expected factor (Figure 2).

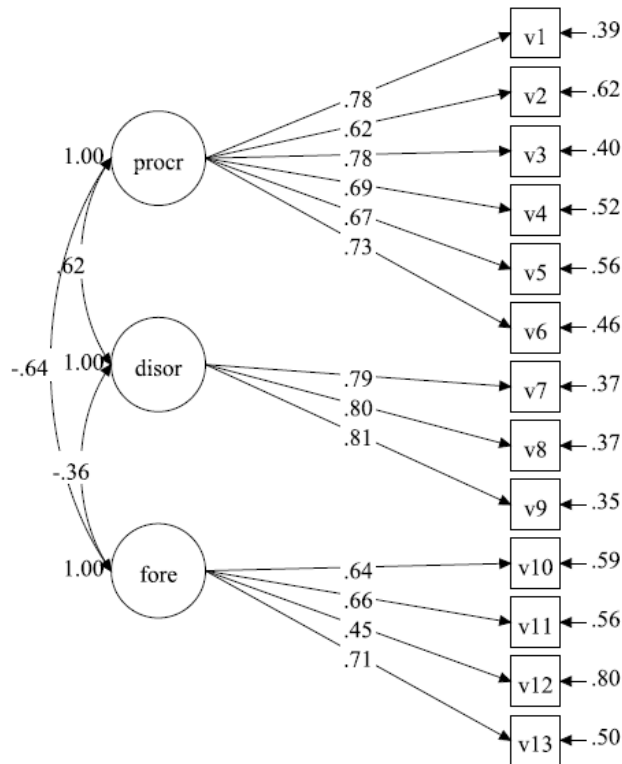


Figure 2: Confirmatory factor analysis: Three-factor model consisting of separate latent factors representing procrastination, disorganisation, and forethought (values are standardised coefficients).

Descriptive statistics and correlations with exam scores at the end of the semester

The scores on the three dimensions obtained a satisfactory distribution. Skewness was between .61 and .71 and kurtosis, between -1.11 and -.10. As presented in Table 4, the correlations were positive and moderately high between procrastination and disorganisation ($r = .53, p < .001$). They were negative and moderately low between forethought and procrastination ($r = -.44, p < .001$) and also between forethought and disorganisation ($r = -.25, p < .001$). Correlations with the test results at the end of the semester were significant but weak for two dimensions: positive for forethought ($r = .21, p < .001$) and negative for disorganisation ($r = -.18, p < .01$). The correlation between procrastination and exam scores was not significant.

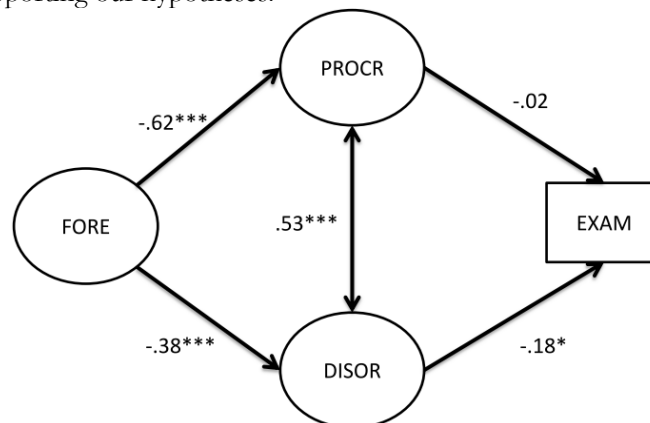
Table 4: Descriptive statistics, reliabilities, and correlations for the study variables (Study 2, N = 303)

	<i>M</i>	<i>SD</i>	PROCR	DISOR	FORE	α
Procrastination	3.85	1.33	1			0.86
Disorganisation	3.13	1.41	.53***	1		0.84
Forethought	4.65	1.18	-.44***	-.25***	1	0.71
Exam (multiple choice)	8.20	2.99	-.11	-.18**	.21***	

Note: ** $p < .01$; *** $p < .001$

Structural equation modeling

In order to test all of the hypotheses in our theoretical model, we also developed a causal-path model based on the model presented in Figure 1. This causal model (Figure 3) fits the data well ($\chi^2(73) = 158.33, p < .001$; RMSEA = .06; 90% .05-.08; CFI = .95; TLI = .93; SRMR = .06). As hypothesised, the path coefficients between FORE and PROCR and between FORE and DISOR were negative. Likewise, DISOR negatively predicted exam scores. In contrast, the path coefficient linking PROCR to exam scores was nonsignificant. These results are similar to those found in Table 4, with all of the correlations supporting our hypotheses.



Note: * $p < .05$; *** $p < .001$

Figure 3: Causal-path model of the relationships between the three self-regulation factors and success on exams.

General discussion

The aim of this study was to validate a model of self-regulated learning failure describing the relationships between the forethought phase of SRL, procrastination, disorganisation, and academic performance. Three hypotheses underlying this model were tested. The first was that procrastination and disorganisation are two different constructs. The results of the CFA (Study 2) corroborate this hypothesis. Indeed, the model in which procrastination and disorganisation are two distinct constructs fits the data better than a model that sees them as two facets of a second-order factor (Model B) or a model that combines them into one and the same factor (Model C). As expected, the correlation between procrastination and disorganisation was moderately high, estimated at .62 by the CFA for the latent variables. Disorganisation and procrastination, then, are two different and intercorrelated constructs.

The second hypothesis we tested was that disorganisation and procrastination result from low-quality processing during the forethought phase. We attempted to validate this hypothesis in two steps. Study 1 was designed to replicate the results for the achievement goals set by the learner during the forethought phase. Our results are consistent with those obtained in earlier studies: performance-avoidance goals proved to be positive determinants, and mastery-approach goals, negative determinants, of both procrastination and disorganisation. However, unlike cognitive disorganisation, procrastination was not significantly predicted by mastery-avoidance goals, contrary to our expectations. It is difficult to propose a satisfactory explanation for this finding. Note, however, that the lack of a positive effect of mastery-avoidance goals on procrastination had already been observed by Strunk et al. (2013). The impact of other forethought processes, namely, goal setting, time management, and the value assigned to the task, were tested in Study 2. The causal-path model showed, in line with our hypotheses, that the forethought variable was a negative predictor of procrastination and disorganisation. Procrastination and disorganisation were promoted by poor-quality processing during the forethought phase, indicating faulty proactive regulation, known to be crucial to successful self-regulation (Pintrich, 2000; Zimmerman, 2000). These results extend those already obtained for achievement goals and self-efficacy, and in doing so, strengthen the theoretical grounds supporting the claim that procrastination and disorganisation are two different forms of SRL failure.

The third hypothesis underlying our model states that both procrastination and disorganisation have a negative impact on academic performance. As expected, the effect of disorganisation on performance was negative. On the other hand, procrastination had no effect on performance. One explanation of this finding could be that procrastination scales in fact measure two different ways of delaying an action, with opposing effects. Recent studies have identified an active form of delaying an action, called by various names including strategic delay (Klingsieck, 2013), active procrastination (Choi & Moran, 2009; Kim & Seo, 2013; Strunk et al., 2013), and active delay (Corkin, Yu, & Lindt, 2011). In this kind of procrastination, work is put off deliberately in order to obtain better results, because working under pressure enables the person to function at an optimal level.

The procrastination scale we used is based on behavioural indicators of delayed action, but it does not explore the motivations likely to underlie this behaviour. It is possible that the behaviours described therein might be undertaken for different reasons. However, if procrastination is a strategy that translates into success rather than failure in self-regulation, it is theoretically inconsistent to find that it is negatively predicted by the forethought variable.

In this light, we propose another explanation based on the idea that the quality of information processing has a greater impact on performance than the deferral of starting to work. Procrastination produced emotional discomfort but did not necessarily translate into disorganised learning strategies, as shown by the moderately high correlation between the two scales. These results are compatible with what we already know about the relationship between procrastination and academic performance. Although this correlation is usually negative and significant, with a low to moderate magnitude, the lack of a relationship has also been reported (Seo, 2011; Steel, 2007). Moreover, the absence of such an effect could be linked to how performance is assessed. For instance, a lack of interest in the proposed task, or the fear of failure, could lead the learner to take a superficial approach. In fact, such an approach may not even hinder success if the assessment mode (e.g., the multiple-choice test used here) does not require elaborating upon or transferring the knowledge acquired (Kember, Biggs & Leung, 2004; Senko, Hulleman & Harackiewicz, 2001). Accordingly, it would be worthwhile to test for the effects of procrastination on performance using an assessment mode that requires deeper strategies.

Conclusion

The results obtained here make a significant contribution to the theoretical clarification of self-regulated learning failure, and therefore fulfill the objective set forth at the onset of this study. The results obtained here fully validate two of the hypotheses that follow from our proposed model: firstly, that procrastination and disorganisation can be regarded as two distinct processes, each one corresponding to a separate route toward SRL failure, and secondly, that both are positively predicted by low-quality processing during the forethought phase. Our third hypothesis was only partially validated. Disorganisation indeed produced a negative effect on academic performance but procrastination had no impact. Future research should further test this model, notably by varying the performance indexes used. At the theoretical level, the inclusion of disorganisation in our model of SRL failure makes it possible to articulate two perspectives, self-regulated learning and students' approaches to learning, which have generally been treated separately despite the proximity of the issues under study. Future studies should focus more specifically on disorganisation, which has not been studied as much as procrastination.

Finally, by demonstrating the impact of disorganisation on academic performance, our results open up some new pedagogical avenues. Insofar as disorganisation is fueled by difficulty in arriving at a clear understanding of the teacher's expectations, it seems important that teachers be urged not only to spend ample time explaining what they

expect of their students for the assigned task, but also to pay particular attention to ensuring that their students understand.

There are some limitations to the present results. One limitation of this study concerns the scope of the results. The data was obtained in the specific context of first and second-year French university students, who were making the difficult transition from secondary school to university. It would be useful to replicate these results with higher-level students, and in another context of higher education. It would also be worthwhile to replicate these results on a sample with a more balanced sex ratio. A second limitation lies in the fact that procrastination and disorganisation were measured in a general way, that is, without contextualising the measures with respect to a given course, while academic performance was measured for a particular course. In all likelihood, the students' responses to the same questions would vary as a function of course context (Hadwin et al., 2001). Future research should therefore study correlations with academic performance using course-specific measures of procrastination and disorganisation. Finally, a third limitation is that forethought processes, procrastination, and disorganisation were measured by a self-report method. This method can assess propensities to develop forethought processes, procrastination and disorganisation, but more process-oriented measures are required to measure self-regulation in a more effective way (Pintrich, 2004; Panadero, Clug & Jarvela, 2016).

Acknowledgment

This research was conducted in the Department of Psychology, University of Paris-Ouest La Défense, France.

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Please cite as: Cosnefroy, L., Fenouillet, F., Mazé, C. & Bonnefoy, B. (2018). On the relationship between the forethought phase of self-regulated learning and self-regulation failure. *Issues in Educational Research*, 28(2), 329-348.
<http://www.iier.org.au/iier28/cosnefroy.pdf>