

# Priming Motivation in a Second Language: A Preregistered Report

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## ABSTRACT

In the field of second and foreign language education, conscious cognitive models of motivation dominate, while the role of unconscious motivation has not been studied systematically. Expanding the language motivation research to include implicit processes is likely to enrich the field of language learning and open up new contributions to current knowledge in this domain. To date little research has examined priming effects in the field of language learning motivation. The purpose of this study was therefore to contribute to this literature using a within-subject experimental design that aimed to prime motivation for language learning in an instructed setting. Specific aims of our study were: (1) to construct implicit measures for motivational priming in the field of second language education; (2) to examine the feasibility of experimentally priming implicit motivation for second language learning, using self-report motivation and attitudes as an explicit control, and to identify what effects this priming has on key behavioral outcomes. We preregistered our design and statistical analyses prior to undertaking this study, and then we adhered to our preregistration protocols. South Korean university learners of English ( $N = 244$ ) responded to motivational and control tasks. Using a within-subject design, we measured language behavior (response latencies, number of sentences produced, and linguistic accuracy) in subsequent tasks, as well as self-reported motivation. We found no evidence of a motivational effect either in language behavior or self-reported motivation. While the initial results reported in this study did not support a significant role played by motivational primes, the study addresses important conceptual and methodological questions that are of interest to the field and which can contribute to growing work on second language motivational interventions.

*Keywords:* motivation, priming, preregistration, second language learning, within-subject design

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## INTRODUCTION

Social priming is one of the most controversial topics in social psychology. It has been argued that incidental exposure to certain cues can activate higher-order cognition and behavior without the individual's conscious knowledge (e.g., Gawronski & Payne, 2010; Meyen et al., 2022; Molden, 2014). Some experimental studies have shown that exposing participants to such primes can influence their behavior either positively or negatively, depending on the nature of the cues, while in subsequent questionnaires and awareness probes the participants deny any effect of these primes on their behavior. Because primes are masked, either appearing very briefly or for an ostensibly different purpose, these primes may still manifest an effect in behavior, reaction time, brain activity, or response to subsequent questionnaires (Al-Hoorie, 2016a, 2016b).

In this study, we aimed to examine whether priming had a motivational effect on language learners. We conducted an experiment where we exposed participants to primes and examined whether this exposure had an impact on the quantity and quality of the language they produced, the time they spent on the task, and subsequent conscious motivation they self-reported.

## UNCONSCIOUS PRIMING

While seminal priming research advanced an optimistic picture of the existence and even the practical, everyday significance of unconscious primes, some researchers failed to replicate some of these findings. For example, Doyen et al. (2012) attempted to replicate a classic experiment by Bargh et al. (1996). Doyen and colleagues failed to replicate the finding that exposing participants to the stereotype of age leads to slower walking, despite using automated timing methods and a larger sample size. Similarly, Williams and Bargh (2008) reported that simply asking participants to plot two dots on a graph subsequently affected self-reported closeness to family members. The further apart the plotted dots, the further they also reported being from their family members. Pashler et al. (2012) attempted to replicate this effect but failed, raising the possibility that the original results were “simply not valid, representing, for example Type 1 errors” (p. 6).

Replication failures may be due major design differences, or hidden moderators, between the initial and replication

studies. These differences may go unnoticed because the current state of knowledge does not appreciate the theoretical significance of certain design or contextual features. Commenting on the failed replications reviewed above, however, Vadillo et al. (2016) lay the blame on certain research practices that question the validity of the initial findings themselves. They argued that this area of research is fraught with questionable research practices including selection bias, reporting bias and *p*-hacking.

Meyen et al. (2022) raised some questions about the analysis procedures applied in some priming research. They demonstrated that in some cases the measures used to detect the effect of conscious decision making versus unconscious priming are different, thus leading to the erroneous conclusion that unconscious priming leads to different outcomes (e.g., better stimulus discrimination). For example, some research implements brain activity or continuous confidence ratings to detect the effects of unconscious priming and compare them with conscious binary decisions. Because of the different sensitivities involved in these measures, it is expected a priori that priming measures are more sensitive, which gives the illusion that priming leads to distinct outcomes. Meyen et al. proposed an alternative approach to calculate such sensitivities and reanalyzed a number of previous priming studies. They reported that, with an improved data processing and analysis approach, the priming effect disappears. Clearly, without transparency, readers may not be able to make a confident judgment about the appropriateness of a set of results.

## THE PRESENT STUDY

As argued by Vadillo et al. (2016) and Meyen et al. (2022) among others, one important step forward in this dialog is using transparent research practices. An important element of transparent practices is preregistration. Preregistration involves the specification of the various aspects of research design and statistical analysis in advance of data collection in the hope of minimizing researcher degrees of freedom and unintentional bias (see Munafò et al., 2017; Simmons et al., 2011).

Building on these efforts, we present a preregistered report testing the effect of motivational priming. Our study provides unique insights from two perspectives. First, our

sample is second language (L2) learners of English. The priming literature has mostly utilized primes presented in the participants' native language (L1). However, it is not clear whether the same effect would be obtained when the cues are presented in an L2—in which the participants are not as fluent. Processing an L2 is typically slower (see Dörnyei, 2009), and so the effect of primes might not be as salient. Primes are typically presented very briefly or peripherally, which may require fluency in the target language in order for these primes to exert their effect, if any. Second, we aimed to examine the relevance of priming to realistic educational settings. Most of the priming literature has been conducted in lab settings. It is not clear to what extent educators can benefit from this literature in their daily practice. It is possible that typical distractors around learners might lessen the effect of these primes making them of little practical consequence.

In our study, we applied a within-subject design and gave our participants tasks very similar to those found in their L2 textbooks (controlled practice with sub-discourse level language that builds explicit L2 knowledge). We then asked them to produce as many grammatically correct English sentences as they could (also a typical classroom activity for practice and consolidation of L2 learning). The task was completed as a homework assignment like any other routine activity students perform at home. We examined the time it took them to produce the sentences, the number of these sentences, and their linguistic accuracy. Thus, our ultimate aim was to recreate a common educational activity and then test whether applying motivational primes would enhance performance in it.

We hypothesized that, if motivational primes do have an effect, the participants would spend more time thinking about sentences, attempt to produce more of them, and possibly produce more accurate sentences, though the latter is likely to be constrained by the participants' proficiency level. In contrast to these language behavior effects, we hypothesized that self-reported motivation would remain unaffected.

To summarize, we asked the following two research questions:

- 1) Does motivational priming have an effect on language learning behavior?

- 2) Does motivational priming have an effect on self-reported motivation?

## METHOD

### Participants

We set out to recruit a fairly typical and non-affluent sample of post-secondary language learners from compulsory L2 classroom settings using criterion sampling. Our inclusion criteria were that non-language major undergraduate students be enrolled in one or more general education, credit-bearing English language class in a public post-secondary institution. Given the battery of tasks we intended to present them with, we specified that learners' levels of proficiency be between novice high and intermediate high, which we verified by checking class diagnostic assessment data used to level-place students. Potential participants should, additionally, not be enrolled in any extra-curricular language classes outside of the compulsory classroom setting and not have more than the 6–8 years of compulsory language education typical of public-school students. Potential participants were excluded from the sample if they reported either a period of study-abroad in an English-speaking country of more than 6 months, or if they had regular, sustained language contact with L1 users of English. We contacted five large public post-secondary institutions in the capital of South Korea, Seoul. Participation in the study was voluntary and uncompensated. A total of 244 participants (female = 176) qualified for the final analysis (see Data Analysis for exclusion details) and had an age range of 17–25 ( $M = 20.4$ ,  $SD = 1.09$ ). Their proficiency levels included intermediate mid (53.7%), intermediate high (20.9%), intermediate low (18.8%), and novice high (6.5%). Of participants in our sample, 84% had never visited an English-speaking country, and an additional 7.8% had visited for 3 months or less.

### Instruments

#### *Priming Manipulation*

The participants responded to a 20-item scrambled sentences task involving motivationally charged words. Each item contained five words, and the participant had to first exclude one and then order the remaining words to form a grammatically correct sentence. After that, the

participants responded to a 3-item effort task in which each item contained three words. The participants were asked to generate as many grammatically correct sentences as possible using all these three words in any combination, and to stop only when they were unable to produce any more sentences. The participants then responded to a control scrambled sentences task about camping, a popular leisure activity in South Korea, and another effort task. The sequence of the experimental and the control tasks and two effort tasks were counterbalanced. The complete instrument is available in Appendix A. As explained above, these tasks are fairly typical of the language learning activities featured in our participants' educational setting.

### *Self-Reported Motivation*

The participants responded to the following items in a random order on a 7-point Likert scale (see Appendix B for the complete list of items):

- *Intrinsic Motivation* (6 items,  $\alpha = .93$ ) adapted from Noels et al. (2000).
- *Identified Regulation* (5 items,  $\alpha = .89$ ) adapted from Noels et al. (2000).
- *Self-Efficacy* (4 items,  $\alpha = .86$ ) adapted from Taguchi et al. (2009).
- *Ideal L2 Self* (5 items,  $\alpha = .95$ ) adapted from You et al. (2016).
- *Intended Effort* (4 items,  $\alpha = .86$ ) adapted from Taguchi et al. (2009).

These scales are widely used in the L2 motivation field as measures of different aspects of learner motivation (see, e.g., Dörnyei & Ryan, 2015; Dörnyei & Ushioda, 2021).

### *Awareness Probes*

Finally, the participants' awareness of the hypothesized priming effect was probed. The awareness probes asked each participant about what they thought the purpose of the study was, whether the different tasks were related in any way, whether they believed their answers to one task had an effect on any other tasks, and whether they noticed anything

unusual at all. No participant exhibited awareness of the purpose of the study.

### **Procedure**

Apart from the actual language tasks (the scrambled sentences and the effort tasks), the instructions and the questionnaire items were translated into the participants' L1 (Korean) by a non-affiliated bilingual speaker and then back-translated by us for consistency. All tasks were subsequently loaded onto Inquisit Web 4 (2014). The link was given to the students by a research assistant who was blind to the purpose of the study, and the students were asked to complete the experiment as a homework activity. The participants responded to the scrambled sentences and the effort tasks (with the priming and the control conditions counterbalanced), to self-reported motivation, to demographic questions (including their grade in English in the previous year), and then to awareness probes in this order. Because the language tasks were in English and to avoid potential language interference, the participants were given a printed English–Korean glossary of the words used in these tasks. Throughout, the participants were treated in accordance with the American Psychological Association (APA) ethical principles and guidelines (APA, 2017) following institutional review board approval.

### **Data Analysis**

A few participants ( $n = 11$ ) were excluded for not completing all tasks. A few values were also excluded for violating univariate normality ( $z \pm 3.29$ ), while no participant had to be excluded for violating multivariate normality based on Mahalanobis distance scores. Mahalanobis distance scores were examined against  $\chi^2$  values associated with  $p < .001$  at  $df = 3$  (where the  $df$  refers to the independent variables: priming, gender, and achievement).

We used the mean of each of the five self-reported motivational scales above. As for the accuracy measure, we awarded 3 points for each sentence generated, and deducted 1/4 for each minor linguistic error (spelling and punctuation) and 1/2 for each grammatical error. The total score for each student was then divided by the number of sentences produced—a conventional method for scoring holistic

linguistic accuracy. The participants were divided into high- and low-achievers using a median-split of their English grades. Our data analytic approach was preregistered prior to data collection (a time-stamped copy is available at <https://osf.io/ts46n/>).

We adhered to our preregistration protocols during data analysis, though our sample size fell just short of our target due to practical constraints. Practical constraints and the need to protect the respondents' anonymity also prevented us from obtaining class information, and therefore we were unable to use class as a covariate as planned. Still, the total number of participating classes was, as we anticipated, below 20 and thus we do not expect it to bias our standard errors substantially. Furthermore, our preregistration implied that we would analyze our eight dependent variables (three repeated measures and five not) all in one mixed multivariate analysis of variance (MANOVA). However, it would have been more accurate to state that we would run two models, one for each type of variable. Finally, the response latencies were skewed. However, when we normalized them using square root transformation, there was no effect on the results. We therefore report the results from the untransformed latencies following our preregistration protocols.

## RESULTS

### Primed Tasks

We ran a 3 (treatment: latencies, sentences, and accuracy) by 2 (gender) by 2 (achievement) repeated measures multivariate analysis of covariance (MANCOVA) with counterbalancing condition as a covariate to examine the effect on response latencies, number of sentences produced, and accuracy. The equality of covariance matrices was assumed, Box's  $M = 94.83$ ,  $F(63, 38914.5) = 1.42$ ,  $p = .017$ . The equality of error variances was also assumed as all Levene's tests were non-significant. The results are presented in Tables 1 and 2. The main effect of treatment was significant. There was also a significant interaction between treatment and counterbalancing condition. Neither the interaction with gender nor achievement was significant, however.

Inspection of the significant treatment-counterbalancing interaction effect reveals that it was simply due to the fact that tasks presented first were apparently taken more seriously than tasks presented second. As Figure 1 illustrates, latencies following neutral cues were higher in the counterbalancing condition where the neutral cues appeared first. Similarly, latencies following motivational

**Table 1.** *Descriptive Statistics for Response Latencies, Number of Sentences, and Accuracy for Neutral and Primed Conditions*

Outcome	Gender	Achievement	<i>M</i>	<i>SD</i>
Neutral Latencies	Female	Low	2174.10	2240.85
		High	2078.61	2172.09
	Male	Low	2008.40	2566.51
		High	1864.50	2641.71
Primed Latencies	Female	Low	2390.27	2738.81
		High	2295.89	2967.98
	Male	Low	2185.28	2343.17
		High	1709.40	2031.98
Neutral Sentences	Female	Low	3.76	2.59
		High	4.20	3.03
	Male	Low	3.49	2.52
		High	3.76	2.87

Primed Sentences	Female	Low	3.98	2.71
		High	4.14	3.15
	Male	Low	4.45	3.48
		High	3.84	2.63
Neutral Accuracy	Female	Low	1.86	0.77
		High	1.92	0.81
	Male	Low	1.88	0.74
		High	1.72	0.81
Primed Accuracy	Female	Low	1.86	0.81
		High	1.85	0.83
	Male	Low	2.04	0.56
		High	1.78	0.79

primes were higher when these motivational primes were introduced first. Similar patterns emerged for the other two variables: number of sentences and accuracy. This pattern suggests that the participants were initially interested and expended effort in the first task, but this interest waned in the second task—regardless of whether the task in question was primed or neutral.

### Self-Reported Motivation

We ran a 2 (counterbalancing condition: priming first vs. neutral first) by 2 (gender) by 2 (achievement) MANOVA to examine the effect on the five self-reported motivation variables. The equality of covariance matrices was assumed, Box's  $M = 144.98$ ,  $F(105, 16260.5) = 1.24$ ,  $p = .046$ . The equality of error variances was also assumed as all Levene's tests were non-significant. The results are presented in Tables 3 and 4. All main and interaction effects were non-significant, providing no evidence that the order of the tasks (priming first vs. neutral first) had an effect on self-reported motivation.

### Exploratory Analyses

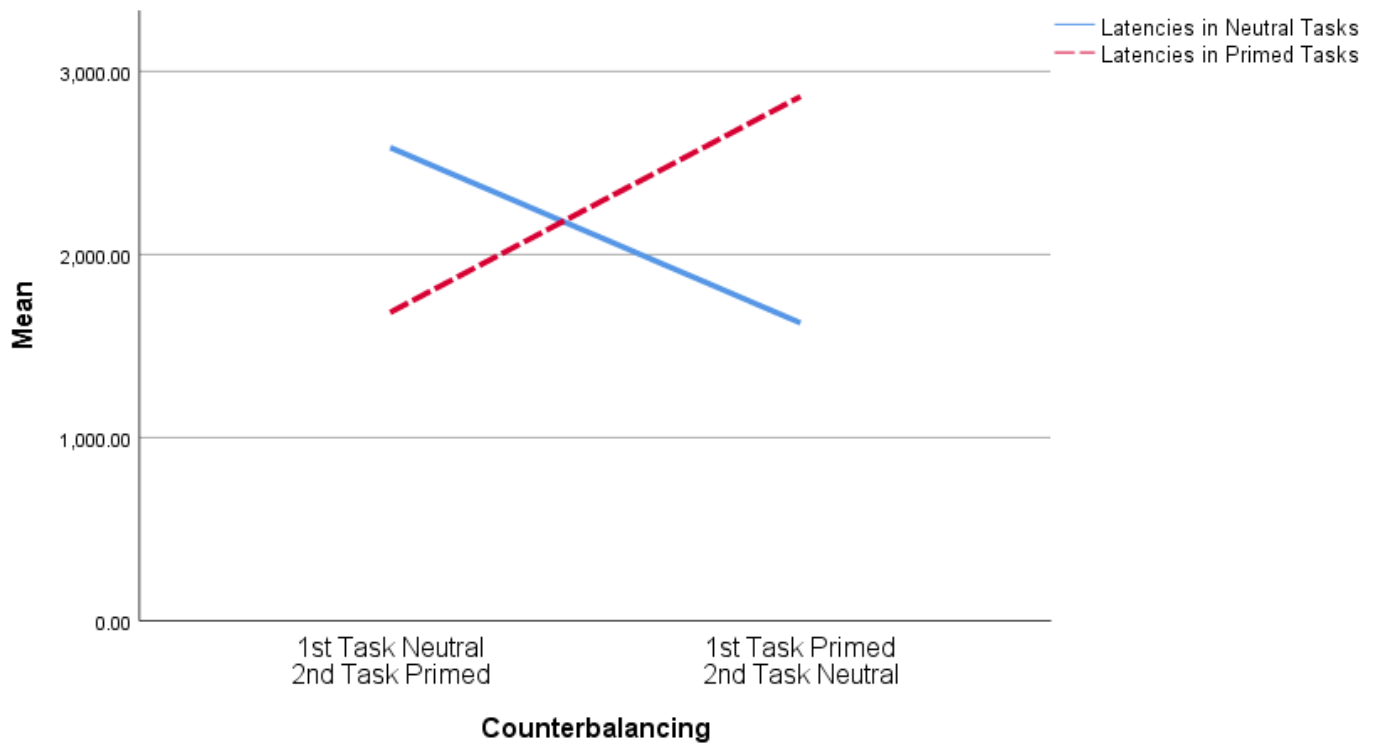
As shown above, the results suggested that the participants were apparently interested in the first task, but then their attention deteriorated in the second task. In order to shed more light on these results, we conducted additional analyses that we did not preregister. In addition to the within-subject analysis presented above, we conducted a

between-subject analysis to examine whether the counterbalancing condition had an effect on the first and the second tasks separately. That is, we asked whether responses to the first task (which received more attention) differed as a function of condition (priming vs. neutral). We then asked whether responses to the second task (which received less attention) similarly differed as a function of condition.

The results are presented in Table 5. The results showed that there were no significant differences between participants who performed the primed or the neutral tasks, either as a first task or a second task.

**Table 2.** MANCOVA Results for the Priming Manipulation

	Pillai's Trace	$F(3, 230)$	$p$	$\eta_p^2$
Treatment	0.21	20.71	< .001	.21
Treatment × Counterbalancing	0.26	27.30	< .001	.26
Treatment × Gender	0.02	1.23	.301	.02
Treatment × Achievement	0.02	1.60	.190	.020

**Figure 1.** Plot of the Interaction Effect of Treatment and Counterbalancing Condition**Table 3.** Descriptive Statistics for the Five Self-Reported Motivation Variables

Outcome	Treatment	Gender	Achievement	<i>M</i>	<i>SD</i>
Intrinsic Motivation	Neutral 1 <sup>st</sup>	Female	Low	4.25	1.49
			High	5.03	1.52
		Male	Low	4.21	1.37
			High	5.04	1.41
	Priming 1 <sup>st</sup>	Female	Low	4.27	1.29
		Male	High	5.05	1.24
Identified Regulation	Neutral 1 <sup>st</sup>	Female	Low	4.98	1.29
			High	5.46	1.42
		Male	Low	4.78	1.30
			High	5.48	1.22
	Priming 1 <sup>st</sup>	Female	Low	4.80	1.38
		Male	High	5.64	1.10
		Female	Low	5.27	1.24
		Male	High	5.23	1.27

Self-Efficacy	Neutral 1 <sup>st</sup>	Female	Low	5.46	1.08
			High	5.95	0.97
		Male	Low	5.07	0.84
			High	6.07	0.77
	Priming 1 <sup>st</sup>	Female	Low	5.28	1.20
			High	5.95	0.94
		Male	Low	5.53	1.16
			High	5.95	0.98
Ideal L2 Self	Neutral 1 <sup>st</sup>	Female	Low	4.85	1.66
			High	5.54	1.44
		Male	Low	4.11	1.43
			High	5.49	1.23
	Priming 1 <sup>st</sup>	Female	Low	4.74	1.48
			High	5.45	1.25
		Male	Low	4.93	1.48
			High	5.11	1.43
Intended Effort	Neutral 1 <sup>st</sup>	Female	Low	4.33	1.19
			High	4.93	1.33
		Male	Low	4.20	0.97
			High	5.05	1.25
	Priming 1 <sup>st</sup>	Female	Low	4.11	1.30
			High	5.12	1.06
		Male	Low	4.43	1.41
			High	4.62	1.41

**Table 4.** MANOVA Results for Self-Reported Motivation

	Pillai's Trace	$F(5, 231)$	$p$	$\eta_p^2$
Counterbalancing	0.03	1.45	.209	.03
Counterbalancing × Gender	0.05	2.19	.056	.05
Counterbalancing × Achievement	0.03	1.41	.220	.03

**DISCUSSION**

In this study, we aimed to test the feasibility of priming motivation in L2 learners. We used tasks familiar to learners and similar to those found in their L2 classes to examine whether there is empirical rationale for teachers to apply primes in their typical teaching activities. Our results did not provide evidence for an effect of priming cues on response latencies, number of sentences produced, or linguistic accuracy. Nor was there an effect on self-reported motivation. Our results, though limited to a single language learning context, are not optimistic regarding a practical role that priming can play in the L2 classroom.

These findings suggest that while priming may potentially be a promising approach in theory, it may not have clear and direct practical application in the L2 classroom. However, it is also important to acknowledge

that this study only examined a specific set of priming cues and tasks. It is possible that different types of cues or tasks may have a more significant impact on L2 learner engagement and motivation.

It seems that teachers may benefit more from conventional strategies to enhance student motivation and engagement. Examples include setting clear and specific goals and expectations that are manageable considering

students' proficiency levels, providing regular feedback on their progress, offering support for struggling students, and creating a supportive learning environment with positive student–teacher relationships (Joe et al., 2017). Other examples include enhancing students' perceived competence and autonomous motivation (Al-Hoorie et al., 2022; McEown & Oga-Baldwin, 2019). Clearly, all these strategies rely on conscious motivation.

**Table 5.** *Exploratory Analysis of Responses to First and Second Tasks Separately*

	Outcome	Condition	<i>M</i>	<i>SD</i>	<i>t(df)</i>	<i>p</i>	<i>d</i>
1 <sup>st</sup> Task	Latencies	Primed	2862.72	3322.10	0.68(238)	.494	0.09
		Neutral	2593.78	2746.79			
	Sentences	Primed	4.71	3.27	0.80(240)	.424	0.10
		Neutral	4.38	3.09			
	Accuracy	Primed	1.91	0.79	0.25(242)	.802	0.04
		Neutral	1.88	0.75			
2 <sup>nd</sup> Task	Latencies	Primed	1630.67	1726.67	0.31(240)	.753	0.04
		Neutral	1702.45	1816.34			
	Sentences	Primed	3.62	2.66	0.10(242)	.919	0.01
		Neutral	3.65	2.64			
	Accuracy	Primed	1.84	0.83	0.27(242)	.786	0.04
		Neutral	1.81	0.79			

There are several possible explanations for why unconscious priming was not effective in our study. One is that cognitive processing in an L2 is inherently slower than it is in the L1. This might ameliorate the effect of motivational cues. If this is the case, then a more noticeable effect should be seen in more advanced learners. Our learners' proficiency levels ranged from novice high to intermediate high. Future research should examine this possibility with learners at more advanced levels of proficiency in the target language. Another explanation is that, unlike under lab conditions, there are many potential distractors in real life settings. If this is the case, then the application of priming findings to practical settings might not be as straightforward as one might wish it to be.

A further possibility has to do with the tasks we used. In the control condition, we used the example of camping (see Appendix A for the complete task). We selected camping because it is a common recreational activity in the context of our study. However, it is plausible to argue that camping might not have been perceived as merely recreational and lacking in any motivational potential for these young adults. Instead, camping may have been perceived as particularly motivating and relevant to their interests or goals. Future research should consider this possibility by varying the content of control tasks.

Finally, it is possible that the participants might not have taken the task seriously. Conducting an experiment in a lab not only helps exercise more control over study conditions,

but might also encourage participants to take the task more seriously due to the physical presence of researchers. Increasing motivation and engagement both inside and outside the classroom is an important concern that teachers all over the world have (Hiver et al., 2021). In our case, we aimed to test the effect of priming motivation on homework performance, a place where teachers are not available to supervise students or to eliminate distractors. Some research findings stemming from lab-controlled settings may not be readily transferable to naturalistic classrooms because of the numerous additional factors, known and unknown, that are present in real-world learning situations. Findings from the lab may therefore have important contributions to theory and understanding, for example, cognitive and motivational processes, but they may be less relevant to practitioners who have to deal with the complexities of everyday classrooms (Al-Hoorie et al., 2021).

#### Authors' contributions

AAH: Conceptualization, Methodology, Formal Analysis, Writing – Original Draft. PH: Investigation, Data Curation, Resources, Writing – Review and Editing. Both authors read and approved the final manuscript.

#### Ethics Approval & Consent to Participate

This study was approved by the Florida State University Human Subjects Committee (approval no. 2018.23496). All participants provided written informed consent prior to enrollment and data collection in the study.

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## REFERENCES

- Al-Hoorie, A. H. (2016a). Unconscious motivation. Part I: Implicit attitudes toward L2 speakers. *Studies in Second Language Learning and Teaching*, 6(3), 423–454. <https://doi.org/10.14746/sllt.2016.6.3.4>
- Al-Hoorie, A. H. (2016b). Unconscious motivation. Part II: Implicit attitudes and L2 achievement. *Studies in Second Language Learning and Teaching*, 6(4), 619–649. <https://doi.org/10.14746/ssllt.2016.6.4.4>
- Al-Hoorie, A. H., Hiver, P., Kim, T.-Y., & De Costa, P. I. (2021). The identity crisis in language motivation research. *Journal of Language and Social Psychology*, 40(1), 136–153. <https://doi.org/10.1177/0261927X20964507>
- Al-Hoorie, A. H., Oga-Baldwin, W. L. Q., Hiver, P., & Vitta, J. P. (2022). Self-determination mini-theories in second language learning: A systematic review of three decades of research. *Language Teaching Research*, Advance online publication. <https://doi.org/10.1177/13621688221102686>
- American Psychological Association. (2017). *Ethical principles of psychologists and code of conduct*. Retrieved June 6, 2023, from <https://www.apa.org/ethics/code/>
- Bargh, J. A., Chen, M., & Burrows, L. (1996). Automaticity of social behavior: Direct effects of trait construct and stereotype activation on action. *Journal of Personality and Social Psychology*, 71(2), 230–244. <https://doi.org/10.1037/0022-3514.71.2.230>

## CONCLUSION

Many teachers in different parts of the world routinely give their students tasks to complete at home. These teachers would naturally welcome techniques to help their students take these tasks more seriously. Our results suggest that deliberately peppering tasks with motivationally charged cues might not be a decisive factor in motivating homework engagement and commitment. This finding is in line with replication failures in social psychology. It is likely that developing and refining a theory of unconscious processing and its effect on behavior is an important first step toward a productive and fruitful line of research into the applicability of priming to real contexts.

- Dörnyei, Z. (2009). *The psychology of second language acquisition*. Oxford University Press.
- Dörnyei, Z., & Ryan, S. (2015). *The psychology of the language learner revisited*. Routledge.
- Dörnyei, Z., & Ushioda, E. (2021). *Teaching and researching motivation* (3rd ed.). Pearson.
- Doyen, S., Klein, O., Pichon, C.-L., & Cleeremans, A. (2012). Behavioral priming: It's all in the mind, but whose mind? *PLoS One*, 7(1), e29081. <https://doi.org/10.1371/journal.pone.0029081>
- Gawronski, B., & Payne, B. K. (Eds.). (2010). *Handbook of implicit social cognition: Measurement, theory, and applications*. Guilford Press.
- Hiver, P., Al-Hoorie, A. H., & Mercer, S. (Eds.). (2021). *Student engagement in the language classroom*. Multilingual Matters.
- Inquisit. (2014) (Version 4.0.5.0) [Computer software]. Millisecond Software.
- Joe, H.-K., Hiver, P., & Al-Hoorie, A. H. (2017). Classroom social climate, self-determined motivation, willingness to communicate, and achievement: A study of structural relationships in instructed second language settings. *Learning and Individual Differences*, 53, 133–144. <https://doi.org/10.1016/j.lindif.2016.11.005>
- McEown, M. S., & Oga-Baldwin, W. Q. (2019). Self-determination for all language learners: New applications for formal language education. *System*, 86, 102124. <https://doi.org/10.1016/j.system.2019.102124>
- Meyen, S., Zerweck, I. A., Amado, C., von Luxburg, U., & Franz, V. H. (2022). Advancing research on unconscious priming: When can scientists claim an indirect task advantage? *Journal of Experimental Psychology: General*, 151(1), 65–81. <https://doi.org/10.1037/xge0001065>
- Molden, D. C. (Ed.) (2014). *Understanding priming effects in social psychology*. Guilford Press.
- Munafò, M. R., Nosek, B. A., Bishop, D. V. M., Button, K. S., Chambers, C. D., Percie du Sert, N., . . . Ioannidis, J. P. A. (2017). A manifesto for reproducible science. *Nature Human Behaviour*, 1, 0021. <https://doi.org/10.1038/s41562-016-0021>
- Noels, K. A., Pelletier, L. G., Clément, R., & Vallerand, R. J. (2000). Why are you learning a second language? Motivational orientations and self-determination theory. *Language Learning*, 50(1), 57–85. <https://doi.org/10.1111/0023-8333.00111>
- Pashler, H., Coburn, N., & Harris, C. R. (2012). Priming of social distance? Failure to replicate effects on social and food judgments. *PLoS One*, 7(8), e42510. <https://doi.org/10.1371/journal.pone.0042510>
- Simmons, J. P., Nelson, L. D., & Simonsohn, U. (2011). False-positive psychology: Undisclosed flexibility in data collection and analysis allows presenting anything as significant. *Psychological Science*, 22(11), 1359–1366. <https://doi.org/10.1177/0956797611417632>
- Taguchi, T., Magid, M., & Papi, M. (2009). The L2 Motivational Self System among Japanese, Chinese and Iranian learners of English: A comparative study. In Z. Dörnyei & E. Ushioda (Eds.), *Motivation, language identity and the L2 self* (pp. 66–97). Multilingual Matters.
- Vadillo, M. A., Hardwicke, T. E., & Shanks, D. R. (2016). Selection bias, vote counting, and money-priming effects: A comment on Rohrer, Pashler, and Harris (2015) and Vohs (2015). *Journal of Experimental Psychology: General*, 145(5), 655–663. <https://doi.org/10.1037/xge0000157>
- Williams, L. E., & Bargh, J. A. (2008). Keeping one's distance: The influence of spatial distance cues on affect and evaluation. *Psychological Science*, 19(3), 302–308. <https://doi.org/10.1111/j.1467-9280.2008.02084.x>
- You, C., Dörnyei, Z., & Csizér, K. (2016). Motivation, vision, and gender: A survey of learners of English in China. *Language Learning*, 66(1), 94–123. <https://doi.org/10.1111/lang.12140>

## APPENDIX A. Priming Manipulation Instrument

### Instructions

In the following exercises, you will see two types of questions.

The first type of question gives you FIVE words and asks you to choose only FOUR words and put them in the correct order to make a correct sentence. Here is an example:

Question: yesterday watched I TV him

Answer: I watched TV yesterday.

Notice that the word 'him' was dropped and the other four words were reordered to make the correct sentence.

The second type of question gives you three words and asks you to use ALL three words in as many sentences as you can. Here is an example:

Question: milk, cookies, I

Answer: I like milk and cookies.

I can make cookies with milk.

I have two cookies and some milk.

When I am eating cookies, I also want to drink some milk.

etc.

In this type of question, you should make as many sentences as you can. Stop only when you cannot make any more sentences.

### Neutral task

Minho is a first-year student. Use only FOUR of the following five words to make a correct sentence.

- 1) goes / always / Minho / camping / to
- 2) He / tents / a / uses / large
- 3) two / a / needs / He / hammer
- 4) a / cream / sun / He / has
- 5) some / He / batteries / one / bought
- 6) He / insects / an / hates / large
- 7) new / He / two / has / sunglasses
- 8) He / a / sleeping / needs / bags
- 9) enjoys / time / his / with / He
- 10) his / travels / He / car / by
- 11) with / He / goes / to / friends
- 12) laugh / They / are / a / lot
- 13) swimsuits / is / He / brings / two
- 14) flashlight / has / a / He / two
- 15) Minho / holidays / the / an / likes
- 16) for / likes / He / to / relax
- 17) He / chatting / in / time / spends
- 18) one / shoes / wears / comfortable / He
- 19) a / birds / watches / He / singing
- 20) loves / He / going / to / camping

### Effort A task

Now, you will see three words. Use ALL three words to make complete sentences, in any combinations you like. Write as many sentences as possible. Take as much time as you need to write sentences. Only stop when you are sure you cannot go on. There are three questions in this part.

- 1) mother / visit / Eunkyong
- 2) bicycle / buy / Soojin
- 3) make / pizza / I

### Motivational priming task

Junsu is a first-year student. Make sentences about him. Use only FOUR of the following five words to make a correct sentence about Junsu.

[Note: Priming words are underlined here but not in the actual study.]

- 1) hard / is / Junsu / a / studying
- 2) Chicken / his / is / favorite / for
- 3) is / active / He / his / everyday
- 4) His / high / is / motivation / about
- 5) old / He's / years / 19 / age
- 6) He / in / always / hardworking / is
- 7) an / masters / English / completely / He
- 8) of / two / He / has / brothers
- 9) his / He's / a / student / brainy
- 10) learning / an / He's / about / enthusiastic
- 11) good / on / He's / a / student
- 12) manages / his / He / time / intelligently
- 13) going / a / responsible / He's / student
- 14) a / He's / kid / bright / of
- 15) lives / Junsu / in / on / Seoul
- 16) studying / to / He's / dedicated / for
- 17) He / with / teeth / his / brushes
- 18) learner / to / He's / a / committed
- 19) to / determined / He's / succeed / for
- 20) him / parents / and / His / encourage

### Effort B task

Now, you will see three words. Use ALL three words to make complete sentences, in any combinations you like. Write as many sentences as possible. Take as much time as you need to write sentences. Only stop when you are sure you cannot go on. There are three questions in this part.

- 1) teacher / help / Kang-sook
- 2) drive / car / Hyun-A
- 3) tree / garden / I

## APPENDIX B. Questionnaire Scales

### Intrinsic Motivation

1. I am learning English for the satisfied feeling I get in finding out new things.
2. I am learning English for the pleasure I experience when surpassing myself in my second language studies.
3. I am learning English for the enjoyment I experience when I grasp a difficult concept in the second language.
4. I am learning English for the “high” feeling that I experience while speaking in the language.
5. I am learning English for the “high” I feel when hearing foreign languages spoken.
6. I am learning English for the satisfaction I feel when I am in the process of accomplishing difficult exercises in the second language.

### Identified Regulation

1. I am learning English because I choose to be the kind of person who can speak more than one language.
2. I am learning English because I think it is important for my personal development.
3. I am learning English because I choose to be the kind of person who can speak a second language.
4. I am learning English because I believe that I have some choice about it.
5. I am learning English because I want to.

### Self-Efficacy

1. If I make more effort, I am sure I will be able to master English.
2. I believe that I will be capable of reading and understanding most texts in English if I keep studying it.
3. I am sure I will be able to write in English comfortably if I continue studying.
4. I am sure I have a good ability to learn English.

### Ideal L2 Self

1. I can imagine myself speaking English in the future with foreign friends at parties.
2. I can imagine myself in the future giving an English speech successfully to the public in the future.
3. I can imagine a situation where I am doing business with foreigners by speaking English.
4. I can imagine myself in the future having a discussion with foreign friends in English.
5. I can imagine that in the future in a café with light music, a foreign friend and I will be chatting in English casually over a cup of coffee.

### Intended Effort

1. I am working hard at learning English.
2. I am prepared to expend a lot of effort in learning English.
3. I would like to spend lots of time studying English.
4. I think that I am doing my best to learn English.