Cognitive Closure as a Factor in Perceived Learning and Motivation

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Abstract

We carried out an experiment with the objective of measuring the effect that the promotion of a higher or lower level of cognitive closure in an English as an Additional Language class can have on motivation and perceived learning. It involved 195 students and produced evidence that promoting a higher level of cognitive closure to student's increases motivation by 9 percentage points and perceived learning by 17. The experiment did not control for the students' Need for Closure Scale, which seems to be a promising avenue for future research since this effect is likely to be particularly (or even solely) present for people scoring higher in the Need for Closure Scale (NFCS). At the same time, we recognise a critical inconsistency in the NFCS regarding its assumed continuum. These results might open a realm of possibilities for classroom practices to promote student engagement and for Education businesses to increase retention rates.

Keywords: cognitive closure; motivation; perceived learning; English as an Additional Language

Introduction

Researchers in cognitive and social psychology have been producing evidence that people are generally not accurate when self-assessing their skills and knowledge, as counterintuitive as it may be at first. There are many factors at play when we try to perceive how skillful or knowledgeable we are, including cultural differences in selfperception and situational constraints. There are at least five major factors:

- **The interpretation of one's own current level performance** is frequently inaccurate because people often either lack the very knowledge needed to notice they are doing poorly or they fail to recognise that their performance is above average (Dunning et al, 2003).

- **Social recognition** plays a role, in the sense that the opinions of others relevantly interfere not only with self-esteem but also with the actual outcomes of our performance. That happens mainly when these opinions picture us into stereotypes, meaning that, for example, we can perform worse when that is how others expect due to the identity attributed to us (Steele, 1997).

- **The appropriateness of the task at hand** in relation to the Zone of Proximal Development (Vygotsky, 1929) matters because if it is too close to or too distant from the Zone of Actual Development it will promote little or no learning. Also, even considering that ego depletion might not mean that self-control and willpower are limited resources (Baumeister et al, 1998), one may argue that people are prone to give up when it gets too hard or takes too long to do something, or when they realise they are unable to accomplish a task.

- **The way that the perceived amount of effort put in a task is interpreted** can have a positive or negative influence on motivation and perception of learning depending on the students' mindset (Dweck, 2006). Even when students get the answers right, for example, their feeling of accomplishment can be hindered when they think they struggled to succeed and if they believe that abilities, intelligence and talents are fixed traits.

- **The perceived amount of effort yet to be put in an endeavour** is precisely the factor presumed in our hypothesis. We argue that it also plays a role in the students' degree of motivation and perceived learning. We hypothesised that experiencing cognitive

closure in an English as an Additional Language class could affect how much students believe they learned in that same class.

Need for cognitive closure can be overgeneralised to refer to the motivated tendency to seek structure, simplify complex information and avoid ambiguity (Kruglanski, 1990; Kruglanski and Webster, 1996). Findings, mainly in the fields of social and personality psychology, consistently report evidence that the need for cognitive closure affects cognitive processes associated with problem solving, decision making and a variety of achievement-related variables, such as classroom grades (DeBacker and Crowson, 2006).

Need for cognitive closure, perceived learning and motivation

When addressing motivation in this study, we did not attempt to capture any specific motivation-related variables, such as deeper or shallower cognitive engagement (Craik & Lockhart, 1972; Bandalos, Finney, & Geske, 2003; Greene et al, 2004) and achievement goals (Ames, 1992; Elliot, 1999). Rather, we more generally captured the students' willingness to stay engaged in their studies that seemed to derive from finishing a class. For that, distinguishing between engagement towards mastery (seeking self-referenced standards) and performance goals (seeking institutional and social recognition), for example, would have been unnecessary or maybe even nonproductive. One does not engage in studying an additional language with mastery and performance goals, for there are many more factors at play, such as identity formation and taking pleasure in the activity itself. In future studies, however, it seems promising to analyse whether qualitatively different experiences of cognitive closure might have different effects on individuals with relatively distinct motivators. For example, could a badge granted for a particular achievement have a stronger effect on the performance-oriented students?

Similarly, when addressing perceived learning in this study, we did not control for the students' interpretation of their own current performance level or knowledge, their seeking institutional, social or personal standards, the appropriateness of the task at hand in relation to their current skills and knowledge, or their interpretation of the amount of effort they put in the task. We were not so much interested in the qualitatively diverse references that implicitly or explicitly play a role in establishing the standards for the perception of learning, as we were in analysing if experiencing closure can affect the perception of how close or distant individuals feel in relation to such standards. In other words, we wondered if it would be the case that stimuli that aim at arousing the students' perception of closure impact positively or negatively how much they believe they've learned, regardless of what they think learning an additional language means and how much they expect to learn.

Kruglanski and Webster (Kruglanski, 1990; Kruglanski & Webster, 1996) sustained that Need for Cognitive Closure or Need for Closure (NFC) could be measured in a scale (Need for Closure Scale or NFCS) that aims at capturing the extent to which individuals desire clear, unambiguous and stable knowledge about the world. Such desire is influenced by two general processing tendencies, urgency and permanence, which in turn produce inclinations to engage and pursue or seize and freeze on early information, enhancing or reducing information processing. When individuals experience the urgency tendency, they are constrained to settle for the most immediate and reasonable answer available, and this urgent constraint can be enhanced and become more compelling by influence of perceived benefits and other situational factors (Pierro et al. 2012). When individuals experience the permanence tendency, they are prone to preserve current knowledge against further relevant information. A strong need for cognitive closure induces a desire to have closure urgently and to maintain it permanently. This inclination to seize and freeze and keep perception of reality stable translates into a proportional difficulty in questioning one's prior knowledge and resolve in the face of further evidence, no matter how compelling the new information is. In summary, the NFCS is conceptualized as a continuum ranging from strong strivings for closure to strong resistance of closure.

To date, findings did not correlate NFC with motivation to stay engaged in a task or a longer endeavor nor with how people perceive their learning as a result of such engagement. For example, when not pressed by time or other constraints, students with higher NFC are usually more willing to engage in cognitive efforts, such as searching information before making a decision, and doing some extra research before reaching a conclusion. A study (Jaśko, K. et al., 2015) showed that high NFC participants prolonged the information search more than low NFC individuals when a task did not offer a confident decision rule, but that they shortened the task when a
reliable strategy was suggested. Another research (Harlow, Debacker & Crowson, 2011) looked into the possible relationship between closure needs and the adoption of mastery goals or performance goals, and concluded that "high levels of preference for certainty (...) seem more likely to impede learning than high levels of preference for structure, which seem relatively benign" and that "more work is needed to understand the range of implications for learning that may be associated with excessive preference for certainty" (p. 9).

Taking these findings into account, but in a different direction, we were not interested in the correlation between the NFCS and perceived learning and motivation. The NFCCS inherently establishes dubious oppositions. The contradicting instance of a **strong need to seek closure** could be a **lacking need to seek closure** or a **strong need to seek continuation**, just as much as a **strong need to avoid closure**, in the same way that the opposite of "I hate to change my plans at the last minute" could be "I do not mind changing my plans at the last minute", "I love to change my plans at the last minute" or even "I love to make ongoing plans at all times".

Most importantly, the design of the experiments in the aforementioned studies do not allow us to rule out the possibility that what people seek or avoid might not be only closure itself, but also the consequences of qualitative distinct closures. The need to seek or avoid closure is seen (Webster & Kruglanski, 1994) as stemming from the perceived perks or costs of possessing closure, e.g., envisioned benefits or penalties for an agreeable or erroneous closure, respectively, or perceived good or bad consequences of actions implied by closure, as well as from the perceived disadvantages or benefits of lacking closure, for example, missing out an opportunity or not being a target of possible criticism. The need to seek or avoid closure is controlled by the desire to avoid negative consequences of lacking or achieving closure or to perpetuate the benefits of being certain or not knowing for sure.

If an excessive preference for certainty might derive from fear of being judged, then activities in which closure does not promote the feeling of such threat could make the
"need" less urgent in individuals with higher NFC and make them less protective of the resulting knowledge or conclusion. Similarly, if a closure experience does not promote the feeling of interruption and maintains a sense of continuity (however paradoxical it may sound), then repulse for such closure would be diminished in individuals with lower NFC. The individuals' perception that they have finished a lesson could constitute the kind of closure that the ones with a low NFC would not repel and would still attract the ones with a high NFC.

Given a context in which individuals study English as an Additional Language, their achieving mastery or performance goals would coincide with their perception of closure achievement. One could arguably sustain that once they notice that they have achieved their desired level of fluency or that they have been finally granted the desired certificate, they would experience cognitive closure. In this sense, achieving goals would bring about closure, in a cause-and-effect relationship. However, if achievement and closure do not cause each other, but are simply correlated, or even if, under certain conditions, they coincide, then promoting closure should interfere with the individuals' perception of achievement.

Assuming that the aforementioned propositions are true, we hypothesised that promoting a higher degree of cognitive closure to students of English as an Additional Language, regardless of their score in the Need for Closure Scale, could lead to an increased motivation and a higher level of perceived learning. If validated, this proposition would thus mean that the opposites in the Need for Closure Scale need revision.

Experiment

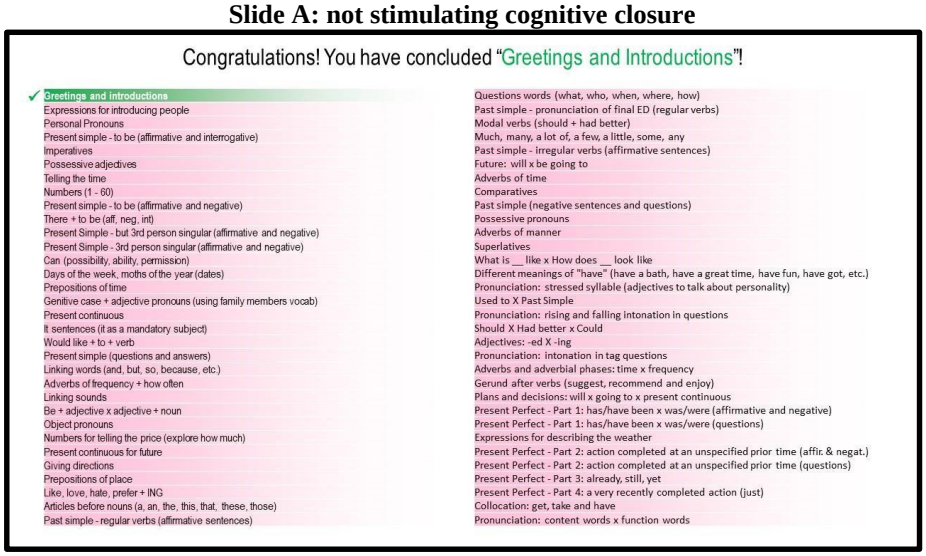
To carry out this experiment, we randomly selected 8 among 64 grammar lessons that were in the schedule of an English as an Additional Language online course. We selected the classes

and not the students because the way this online course works, the students are allowed and encouraged to pick their own complementary grammar lessons according to their interests and level.

Each lesson is live, lasts 30 minutes and does not have a limit to the number of students who may enrol and participate. These classes are not the primary means by which they study English, but have a complementary role. The way they are delivered by the teacher follows a pattern: icebreaker to get students engaged and warmed up; deductive instruction with concept-checking questions to teach the content; and a quiz at the end to promote some retrieval practice.

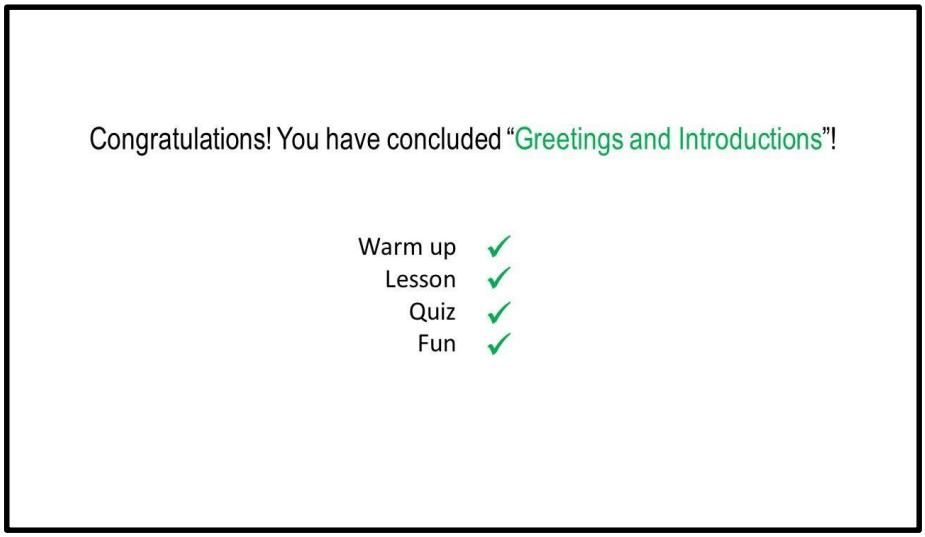
After the quiz, in each one of the 8 lessons selected, the attending students were split into two groups. To one of them the teacher presented a screen (slide A) showing all the 64 grammar lessons and congratulated students for finishing the current lesson, but not without emphasizing that there could be up to 63 lessons ahead of them. The following slide was developed not to stimulate cognitive closure.

Slide A: not stimulating cognitive closure



To the other group, the teacher presented another screen (slide B) showing solely the steps that students had gone through in that class and congratulated them for finishing the current lesson, making no comments about the lessons ahead, homework or anything that could remind them of any work or effort still to be done. The following slide was developed to stimulate the students to experience cognitive closure.

Slide B: promoting cognitive closure



Each group saw the information on the screen (either slide A or B) for about a minute and then were asked to click on a link to answer two questions:

- "How much have you learned in this class?"
- "How motivated are you to keep studying English?"

They answered each of these questions by picking a position in a scale from 1 to 4, in which 1 represented the least amount of learning or the lowest degree of motivation, and 4 was assigned to the most and highest, respectively.

We repeated the exact same process in 8 lessons. There was a total of 195 students participating in this experiment, there being 94 in the group in which cognitive closure was stimulated and 101 in the other group.

Results

The results show that the group that experienced cognitive closure in class reported a higher degree of motivation and perceived learning. Among the students who experienced cognitive closure, 61% answered with the top rate to the question "how much have you learned in this class?", against 43% among students who did not experience cognitive closure. The same happened regarding the degree of motivation stated by the students: 86% among those who experienced cognitive closure, against 77% among those who did not.

Chart 1: degree of perceived learning

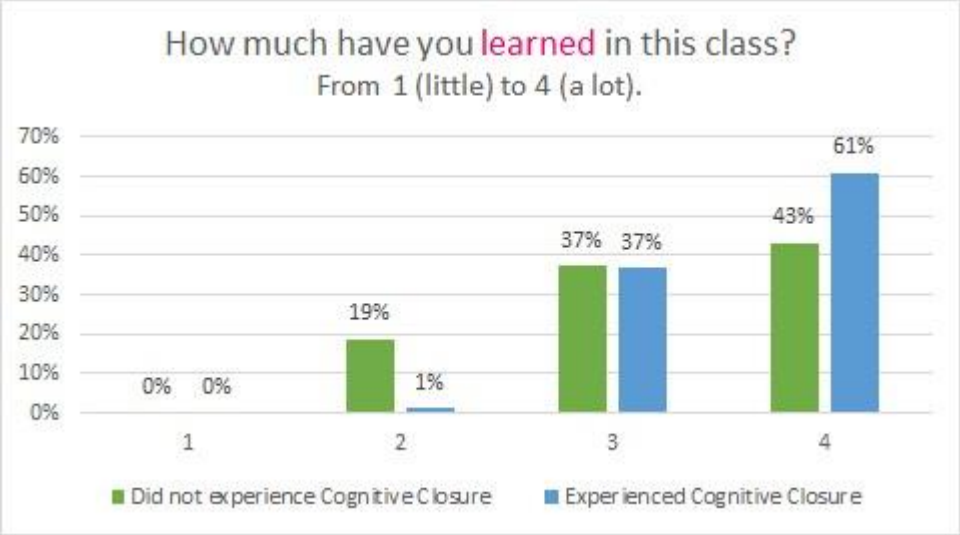
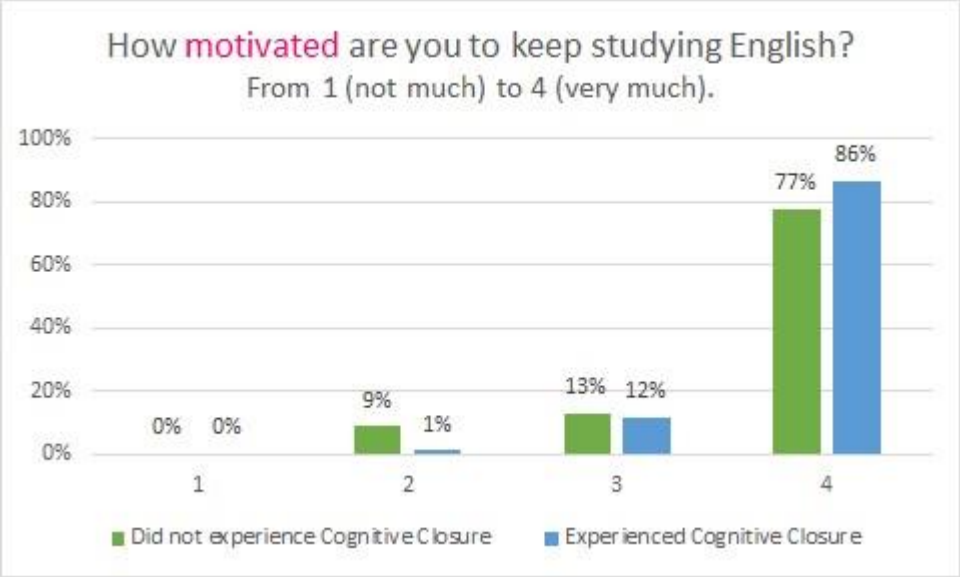


Chart 2: degree of motivation



This is the regression analysis of data collected among participants who did not experience Cognitive Closure:

Regression Analysis: Did not experience Cognitive Closure	
R	0,563170302
R square	0,317160789
R square adjusted	0,310263423
Error	0,521865415
Significance	8,75651E-10
Observations	101

	Coefficients	Error	valor-P
Intersection	2,168351342	0,230767515	2,27058E-15
Perceived learning	0,469501568	0,06923711	8,75651E-10

This is the regression analysis of data collected among participants who experienced Cognitive Closure:

Regression Analysis: Experienced Cognitive Closure	
R	0,383211
R square	0,146851
R square adjusted	0,137577
Error	0,349897
Significance	0,0001377
Observations	94

	Coefficients	Error	Stat t	P-value
Intersection (Stated Motivation)	2,845886	0,257806	11,03886	1,54E-18
Perceived learning	0,281672	0,070782	3,979415	0,000138

How much have you learned in this class? From 1 (little) to 4 (a lot).	Did not experience Cognitive Closure	Experienced Cognitive Closure	Percentage	Percentage Points
1	0%	0%	0%	0,0%
2	19%	1%	-94%	-17,6%
3	37%	37%	-1%	-0,4%
4	43%	61%	42%	17,9%
Average	3,25	3,61	**11%**	-
How motivated are you to keep studying English? From 1 (little) to 4 (a lot).	Did not experience Cognitive Closure	Experienced Cognitive Closure	Percentage	Percentage Points
1	0%	0%	0%	0,0%
2	9%	1%	-88%	-7,8%
3	13%	12%	-9%	-1,2%
4	77%	86%	11%	8,9%
Average	3,69	3,86	**5%**	-

Discussion

The results allow us to argue that the perceived amount of effort yet to be put in an endeavour also plays a role in the students' degree of motivation and perceived learning. They support the hypothesis that experiencing cognitive closure in an English as an Additional Language class could affect how much students believe they learned in that same class and how much they feel motivated to keep studying. However, it is not likely that experiencing cognitive closure directly triggered both increases. It seems more plausible to sustain that experiencing it contributed more directly to the students' perception of better learning results which, in turn, brought about an increment in the degree of their motivation.

The first evidence that supports this conclusion is that there was a higher increase in perceived learning than in motivation. We observed a higher degree of perceived learning among students who experienced cognitive closure in their class when compared to those who did not. Among students who experienced cognitive closure,
61% answered with the top rate to the question "how much have you learned in this class?", against 43% among students who did not. On average, students who experienced cognitive closure reported a degree of perceived learning 11% higher. As for the degree of motivation, the students who experienced cognitive closure reported a perception 5% higher when compared with those who did not. The graphs also show that 86% of those who experienced cognitive closure answered with the top rate in degree of motivation, against 77% among those who did not. The fact that perceived learning increased more than twice as much suggests that cognitive closure has either a weaker or an indirect effect on motivation, or both.

The second evidence concerns the covariation of the perceived learning and the declared degree of motivation. Among the responses of individuals who did not experience cognitive closure, there is a relatively strong relation between motivation and perceived learning, with a correlation coefficient of 0,5632. We can say that this coefficient is relatively high due to the complex nature of motivation and selfassessment and their variables. However, the correlation coefficient between the same two variables (perceived learning and declared degree of motivation) among those who did experience cognitive closure is a lot lower: 0,3832. Arguably this is so because in this group of individuals we introduced a new variable to perceived learning: NFC. This probably means that experiencing cognitive closure influenced the students' perception of how much they had learned but did not directly affect their degree of motivation, which was probably influenced by their enhanced perceived learning. In any case, even though it is not easy to sustain that there was a direct strong correlation between NFC and motivation, evidence suggests that there is a positive correlation, even if it is mostly or entirely mediated by NFC's effect on perceived learning.

One possible explanation of this result is that motivation considerably contributes to the students' short- and long-term engagement in their own learning process and to critical executive functions, such as concentration and attention, making learning an autotelic experience. Developing a skill or competence, such as speaking another language, entails the articulation of declarative and nondeclarative learning systems and the development of highly complex competencies, which often require time and effort to mature in the brain. In this sense, the amount of study and practice hours and the degree of engagement matter to learning results themselves. At the same time, motivation can progressively fade away if students do not actually learn and notice that they are learning. Apart from the inappropriateness in relation to the Zone of Proximal Development, where skills and knowledge are maturing, if the task is too easy, it might be tedious; if it is too challenging, it might be frustrating. As many studies reported (Khoshnoud, Igarzábal & Wittmann, 2020), a balanced match between the level of difficulty of a task and the individual's skill level at the corresponding task can increase theta and delta waves activity in the individual's brain. In summary, it seems that motivation can contribute to more learning and that more perceived learning can increase motivation. Adding to the complexity of this relationship, we are not necessarily proficient in assessing our own skills and abilities (Dunning et al, 2003), meaning that educators cannot simply assume that students will automatically notice their learning when they do learn. Learning does not equal perceived learning.

Final remarks

The emerging evidence in our experiment shows that experiencing cognitive closure can bring about an increase in motivation and an enhanced perception of learning, remaining unsettled whether cognitive closure enhances people's perceived learning, which in turn augments their motivation, or cognitive closure improves motivation and perception of learning altogether. Given that the correlation coefficient between motivation and perceived learning is lower in the results among those who experienced cognitive closure, we argue that the effect on motivation is indirect.

Such results are of great interest for the education and instructional businesses because a positive effect on perceived learning and motivation is likely to translate into an increase in the customer's perception of value and a decrease in churn, respectively. But they are especially interesting for educators in general because providing students with cognitive closure experiences in class might trigger a virtuous circle that can keep students engaged in the long-term, granting them the amount of time and meaningful practice that highly complex skills and competences require to be developed. Learning alone is not enough; students should also perceive their progress and stay motivated to keep on learning.

In future research, controlling for the effect of cognitive closure in individuals with higher and lower scores in the NFCS may yield interesting results. Given the presumed relationship between motivation, perception of learning and actual learning, investigating the possible effects of cognitive closure on learning itself might also constitute a promising avenue for studies.

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