



Exploring male English major's motivation trajectory through complex dynamic systems theory

Yang Gao¹ · Xiaochen Wang¹ · Pinwei Fan²

Accepted: 28 July 2023 / Published online: 9 August 2023

© The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2023

Abstract

Taking complex dynamic systems theory as a theoretical stance, this paper explores how motivational dynamics co-evolve with academic affordances for male English majors in higher educational institutions. The study adopts a sequential mixed-methods design with both questionnaires and interviews being used for data collection. The participant sample included twelve male English major students from a university in a Chinese coastal city. By mapping four participants' lived experiences in their programs, the study further depicts changes, stability, and variability in students' motivation trajectories. The findings of the study suggest that male students' motivation is complex, dynamic, and non-linear. Various initial conditions closely interact with affordances and move towards attractor states dominated by career planning and glocal (global and local) policies. This includes social affordances (glocal policies, curricula, and program lecturers or mentors, who may sustain the motivation trajectory of students) and individual affordances (individual language proficiency, academic performance, and agency which may inform changes during the motivation trajectory). Joining the existing literature, this study advocates moving studies on motivation towards a complex, non-linear theoretical stance. The study also offers insights for language lecturers and universities more generally to make English major programs more inclusive and ensure equality of opportunity for male students to enter and participate in English programs.

Keywords Motivation · Affordances · CDST · Male English-major students · Case study

Introduction

The study of learning motivation is crucial to ensure effective teaching and learning in higher education institutes (HEI) for all students, including English major students (Wang et al., 2022). Different frameworks have been employed to study learning motivation with the aim of increasing motivation for learners (Al-Hoorie, 2017; Al-Hoorie & MacIntyre, 2019; Kim & Doo, 2022; Kam & Umar, 2023). Initially, the study of language learning motivation, in particular, concentrated on types and classifications of motivation from “integrative” and “instrumental” perspectives (Gardner & Lambert, 1972), which were mainly static. In recent years, scholars have shifted toward a more complex and dynamic

framework to explore the trajectories and attractor states of motivational changes. Contemporary work in the field now views learners in a holistic way. For example, Zheng et al. (2020) in their study of Chinese learners' multilingual motivation. Few current studies have divided English major students by gender, although differences between male and female learners have been identified, particularly in terms of motivation (W. Guo et al., 2023).

Based on this background, we collected questionnaires from 12 male English major students and conducted in-depth focus group interviews with four of them. Furthermore, this paper adopts the Complex Dynamic Systems Theory as a guiding framework to identify the motivation types and changes and the internal and external factors leading to these changes from general and individual perspectives. In CDST, the term “initial conditions” refers to the state or set-up that a system begins with, which can have an impact on how it behaves in the future. “Attractor states” represent stable and consistent patterns of behavior that a system tends to adopt, even when external factors are introduced. “Emergent affordances” refer to the potential for

✉ Xiaochen Wang
wangxiaochen66666@outlook.com

¹ School of Foreign Studies, Xi'an Jiaotong University, Xi'an, Shaanxi, China

² University of Tsukuba, Tsukuba, Ibaraki 305-8577, Japan

new opportunities or options for action that can arise from the interactions between the parts of a system. These possibilities are not pre-programmed into the system but emerge naturally as a result of its internal dynamics and interactions (Larsen-Freeman & Cameron, 2008). Therefore, in the current study, male students' motivational development is examined through the lenses of initial conditions, attractor states, and emergent affordances involved in students' academic program trajectories. The following research questions were developed to help guide this inquiry:

1. What are the overall features of English male students' motivation system, in terms of initial conditions and attractor states?
2. How did affordances inform changes in the motivational trajectory of male English major students?

First, key terms are defined that assist in contextualizing the study. Participant details and methodology are discussed, followed by the study results. This study suggests that career planning and global policies play an important role in male student motivation. This includes both social affordances and individual affordances. The importance of this study lies in its ability to provide key information for English departments and universities in China and abroad to encourage and increase male student enrollment and retention in English programs. This may ensure equality of opportunity for male students in English programs, especially for those who are educated in societies that adhere to more strict gender roles in work and study.

Literature review

English language learning is a substantial subdiscipline of most English departments, especially in a Chinese context and so it is being given a prominent position within the discussion of research and literature (Wang et al., 2023; Pan et al., 2023; Wang & Guan, 2020). The term "motivation" is commonly defined as "the extent to which the individual works or strives to learn the language because of a desire to do so and the satisfaction experienced in this activity" (Gardner, 1985, p. 10). Based on Gardner's (1985) definitions, Al-Mahrooqi and Denman (2014) defined motivation as "an energy or desire that drives a learner's actions to direct achievement and generate self-satisfaction" (p. 103). The above definitions indicate that the attitudes and interests of the learner play an essential role in the motivation that a student may have toward learning.

Examination of motivation is also a growing field in terms of second language acquisition (e.g., Park & Ko, 2017). Initially, the study of second language learning motivation was

divided into *integrative* and *instrumental* motivation types (Gardner & Lambert, 1972). More recently, the primary types of motivation in second language learning are categorized as determining and experiencing success, encouraging one's interest, increasing one's capabilities, and possessing a positive disposition toward learning (Elena, 2014). English learning motivation, in addition, has been linked to learners' intellectual abilities, creative and critical thinking language usage, and willingness, all of which are intrinsic factors (Elena, 2014).

Flexible and effective frameworks have proven to help explain language learning motivation (Larsen-Freeman, 2019). For example, Allen (2010) used activity theory to investigate the development of language-learning motivation during a six-week study abroad for six intermediate-level students of French. Lamb (2012) utilized Dörnyei's second language motivational self-system as the theoretical framework to examine the motivation to learn English of Indonesian junior high school pupils. Using questionnaire data, Samad et al. (2012) applied integrative/instrumental theory to investigate the relationship between motivation and language proficiency of Iranian English as a Foreign Language (EFL) learners studying at a university in Malaysia. Dincer and Yesilyurt (2017) used self-determination theory to explore the relationships between EFL learners' motivation to speak, autonomous regulation, autonomy support from lecturers, and classroom engagement. Unlike the above studies, the current research focuses on the long-term motivation of male students with questionnaires, and interview data collected and contextualized through a CDST lens.

CDST combines changes in motivation types, dynamic environments, and interactions among types of complex motivations. It is applicable to the study of changes in learning motivation because learning motivation itself is a complex phenomenon, involving various interacting elements and variations. The dynamic complex systems theory offers an effective framework for understanding and explaining these intricate phenomena. The basic idea of the dynamic complex systems theory is to study and explain complex systems composed of multiple interacting elements that evolve and change over time, exhibiting nonlinearity and self-organization. It emphasizes the dynamical nature of systems, the non-linear interactions among elements, and the emergence of self-organized structures. This theory provides powerful tools and methods for understanding complex phenomena. Motivation does not work in a vacuum independently but with other motives and contexts (Papi & Hiver, 2020). The motivational development of language learners can be seen as a complex and adaptive system because of the interactions between environmental conditions and motivation types (Papi & Hiver, 2020). There

were three essential features in CDST, variability, stability, and context (Waninge et al., 2014). Dynamic systems always have an initial state or situation, which is referred to as the motivational status of the agent at the beginning stage of their study. States change due to internal or external stimuli but these changes or variations are temporal because dynamic systems have a self-organization function, meaning that dynamic systems come to a stable, preferred state, namely attractor states (Waninge et al., 2014). Context is an essential factor leading to changes because the learner and environment influence each other and push the system to change. Except for context, internal factors also influence changes, such as the transformation of thinking (Scherer, 2001). This change system can occur at any time because motivation may fluctuate at different times and time scales, for example during a class or semester.

Another theoretical foundation we can draw upon is the affordances theory (Gibson, 1977). This theory guides us to believe that different affordances combine organisms with environments.

Affordances come in all shapes and sizes. The many and various forms in which affordances manifest themselves of course constitute great diversity and complexity... Thus we may incorporate in our inventory of linguistic affordances: events and happenings, assumptions and common knowledge, school buildings and libraries, curricula, knowledge of languages other than target languages, the degree of professionalism of language lecturers, the availability of textbooks and dictionaries for learners, computers and monitors for listening to and observing correct pronunciation, native-speaker interlocutors, cognates between the languages known by an individual, and supporting parents. All of these so widely different things, which may be tangible or intangible, are affordances. These kinds of typically human affordances seem to us valid in many formal social settings... (Aronin & Singleton, 2012, p. 319).

Social and individual affordance types (e.g., Good, 2007; Heft, 2001; Aronin & Singleton, 2012), for example, may help learners recognize or become cognizant of their decisions and behaviors during an academic journey. In the study, we argue that social affordances may include external, ecological affordances such as global policies, offered curricula, parental expectations, and individual affordances may include a learner's agency, resistance, language proficiency, etc. Previous studies have argued this type of alignment between motivations and affordances as well (e.g., van Lier, 2000).

Research methodology

Research design

The research design employed a mixed-method approach, utilizing both questionnaires and focus group interviews to gain a comprehensive understanding of motivational trends among participants. Questionnaires were initially distributed to gather an overview of motivational patterns and identify suitable candidates for further participation. Subsequently, the focus group interviews were conducted to delve deeper into the initial data and gain richer insights into the participants' motivations (Cohen et al., 2011). To ensure the credibility and reliability of the findings, researcher observation notes from the focus group discussions were used as a form of data triangulation. In this sense, the case study method was adopted for this research, which is well-suited to gain in-depth understanding of specific contexts, communities, and individuals (Hamilton & Corbett-Whittier, 2012). For language learners, such as the participants in this study, the case study method holds particular relevance, as it allows for a comprehensive exploration of the complex factors influencing their motivations (Duff, 2014).

Participants and setting

This study was conducted at a Chinese university, an institute of science and technology. The twelve questionnaire participants from this university were all junior English majors and had completed five semesters. Four of the questionnaire participants were then invited to an in-depth focus group interview. Student A, Student B, Student C, and Student D began their study in 2018, so had completed 2.5 years of study at the time of the data collection. All four interviewees are Chinese citizens and received their education from the educational system in mainland China.

Data collection & analysis

We mapped out two stages to explore the research questions. In the first stage, questionnaires containing questions about language learning motivations were distributed to the 12 male English major students. The questionnaire data were recorded in Excel and charted for comparison. This data type was collected twice in a longitudinal way, once in the first year of their study and once in their junior year. To be exact, the participants could choose more than one option at a time and may even change their options later in the second questionnaire during their college life. In the second stage, the researcher selected four students (A, B, C, and D) to conduct a retrospective focus group interview. The interview lasted for one hour and was conducted in

Chinese, the native language of the participants. The goal of the interview was to find out the reasons for the changes in motivation patterns that were identified in the questionnaire data and to discover the factors leading up to those changes. To better understand the changes in their motivations, the researcher divided the motivations into motivation and demotivation. Motivation pushed students to study, but demotivation impaired students' enthusiasm (Li, 2013). Factors that motivated or demotivated the English majors were important in identifying crucial changes in motivational patterns (Campbell & Storch, 2011).

Ethical consideration and trustworthiness of the study

All participants provided their written informed consent to participate in this study. In our study, participants were free to leave or cease any time they wish, and there were no consequences. Also, we guaranteed the participants' consent and confidentiality. We made the participants feel at ease when being interviewed. However, they were also informed of leave or suspension of their participation whenever they felt uncomfortable. For the trustworthiness of the study, we drew upon our reflexivity as key to successful audit trail in the data analysis (Nowell et al., 2017), and kept a self-critical account of the research process (Tobin & Begley, 2004).

Findings

The overall features of the Motivation System

Complexity

In the motivation system, complexity is divided into three aspects: types of initial conditions, attractor states, and different emergent and ecological affordances.

As shown in Fig. 1, male English majors have a variety of motivations for majoring in English in the first year of their university life. It is worth noting that college students in China when applying for colleges and attending the entrance exams to colleges, are only required to choose one major for their application (Y. Guo et al., 2023). Therefore, their motivations to choose English as their major are driven by careful decisions. Their learning motivations included: the love of English, the wish to improve their ability, the pressure of exams, the supervision of parents, and the influence of classmates and lecturers. Among them, the pressure of exams is the primary motivation to study English, followed by the love of English and the wish to improve their ability. In addition, the influence of lecturers also has an important role to play in their learning motivation, which is more vital compared with the influence of classmates and the supervision of parents.

Figure 2 shows that the types of attractor states of the male students are very complex in the third year. The factors that influence their motivation are as follows: the pressure of university exams and postgraduate entrance exams, their wish to improve their ability, their love for English, and the influence of classmates and lecturers. In the third year, the pressure of exams remains the primary motivation for these students, but the wish to improve their ability becomes more

Fig. 1 Initial Conditions in Motivation Systems (1st Year of Study)

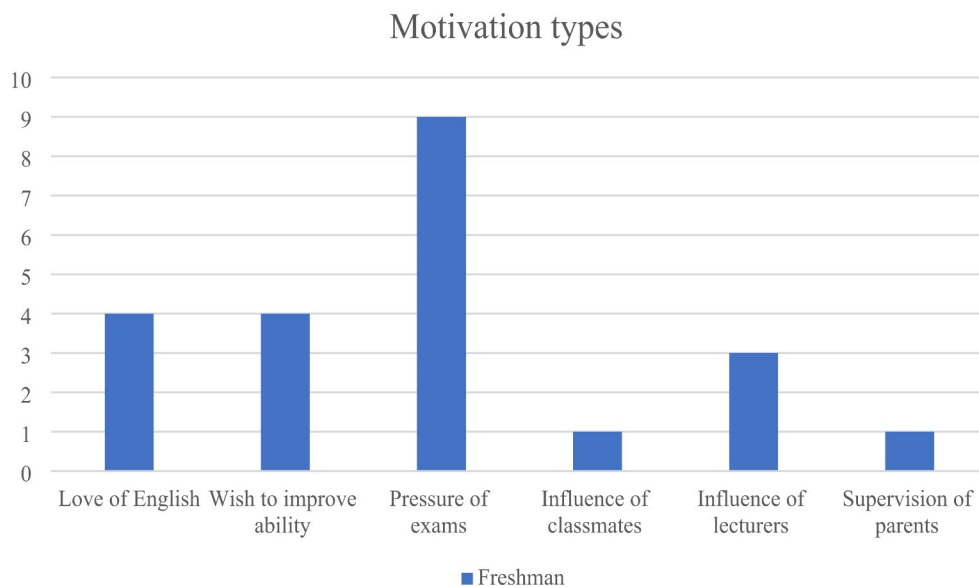


Fig. 2 Attractor States in Motivation Systems (3rd Year of Study)

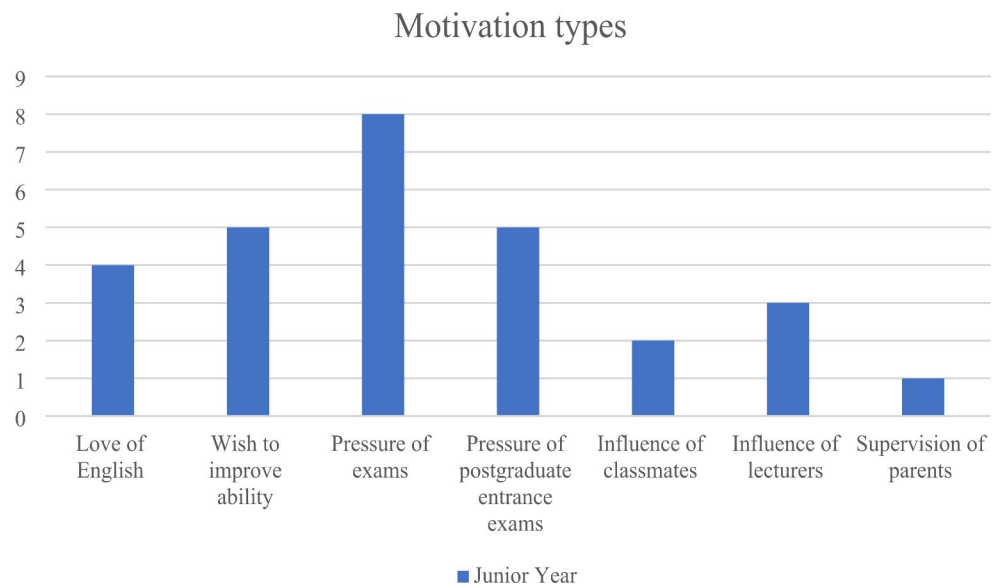
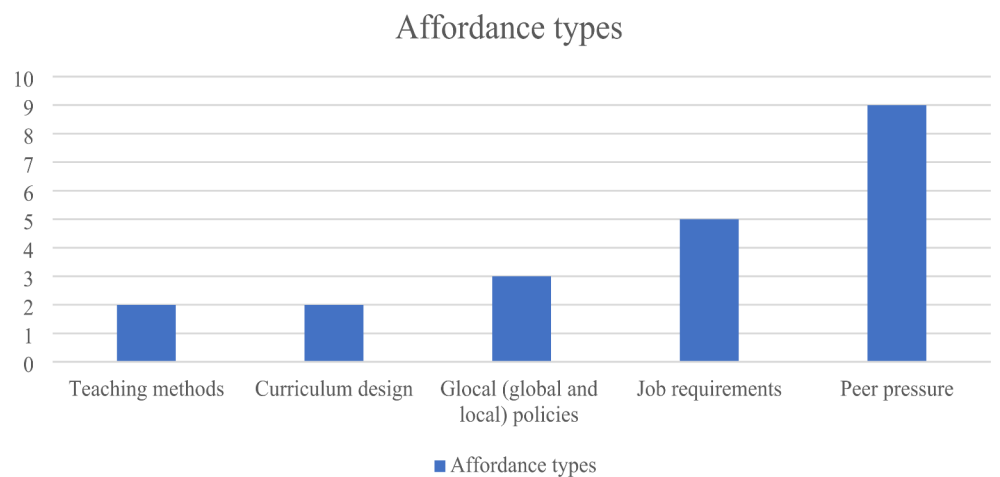


Fig. 3 Affordances in the program



important than before. Additionally, the pressure of postgraduate entrance exams is evident, equal to that of the wish to improve ability. The love for English is the third crucial factor influencing students’ motivation at that time. In the other three respects, the influence of lecturers, the influence of classmates and the supervision of parents also motivated these students to learn, although to a lesser extent.

Figure 3 demonstrates that these male students’ emergent and ecological affordances are very complex. During their four years of study, they continue their studies because of different affordances, including teaching methods, curriculum design, glocal policies, job requirements, and peer pressure. Among them, peer pressure is the most important affordance, followed by job requirements and glocal policies. In addition, the curriculum design and the teaching methods are thought to provide equal affordance for these students in their studies.

Non-linearity

A single, initial condition may not steer a student toward a specific attractor state in the (de) motivation system. In terms of the motivation, the initial conditions of Student A are the wish to change his major and improve his capabilities in the subject area, and attractor states are from the pressure of exams and the wish to improve his ability. The initial conditions of Student B are his parents’ wishes and the pressure of exams and attractor states are from his favorite lecturer and the wish to become a master student in the subject. The initial condition of Student C is the wish to pass exams in the HEI, and attractor states are from his favorite lecturer, the intention to improve his performance, and the wish to pass his postgraduate exams. The initial condition of Student D is the pressure of exams in the HEI, and the attractor states are the intention to improve his performance, the wish to pass his postgraduate exams, and the desire to find better employment (see Table 1). When it comes to demotivation,

Table 1 Motivation of the four students

Case	Initial condition	Attractor states
Student A	1. Changing his major 2. Language skill for job market	1. The pressure of exams 2. Expectation to improve ability
Student B	1. Parents' expectation 2. The pressure of exams	1. His favorite lecturer 2. Expectation to become Master of Translation & Interpretation (MTI) or Master of Arts in Applied Linguistics
Student C	1. The pressure of exams	1. His favorite lecturer 2. Intention to improve his performance and ability 3. Expectation to pass postgraduate exams
Student D	1. The pressure of exams	1. Passing postgraduates entrance exams 2. Improving his ability 3. The wish to find better employment

Table 2 Demotivation of the four students

Term	Initial condition	Attractor state
Student A	1. Voluntary swap 2. A challenging class	1. Jobs connected with another domain 2. Online class mode 3. A challenging class
Student B	1. A challenging class 2. Lack of interest	1. His effort in another domain 2. Difficult classes
Student C	Tricky exam mode	Interest in another domain
Student D	One complex subject	N.A.

student A had the demotivation at first due to the voluntary swap and a challenging class, and this demotivation became jobs connected with another domain, online class mode, and a challenging class. The demotivation of Student B changed from a challenging class and lack of interest to his effort in another domain and different classes. Student C's demotivation changed from the tricky exam mode to interest in another domain. Regarding the demotivation of Student D, his demotivation was from a complex subject, and he gradually overcame it in the study (see Table 2).

Findings show that the same initial (de)motivation may not lead to the same attractor state. For example, Students C and D share the same initial motivation for learning: the pressure of exams. However, their attractor states are different. The attractor states of Student C are the teaching method and the wish to become master the skills of translation and interpretation and become achieve a Master of Arts in English Linguistics. In contrast, the attractor states identified by Student D include improving his ability and the wish to find satisfactory employment. Another example is that Student A and B had the initial demotivation because of the challenging class. However, the demotivation of Student A gradually became the jobs connected with another domain, online class mode and a challenging class. In contrast, the demotivation of Student B became the effort in another domain and difficult classes.

In addition, findings show that the same attractor state may come from different initial conditions. Students A,

B, and C share the same attractor state: the wish to pass postgraduate exams. The initial condition of Student A, for example, is the wish to change his major, while for Student B, the wishes of his parents serve as the initial condition. The initial condition of Student C, meanwhile, was the pressure of exams.

Dynamicity

In the motivation system, the learning motivation of the four students changed during the four years. The original motivation of Student A changed from the wish to change his major to the pressure of exams and the intention to improve his ability. Student B changed from the pressure of exams in school and parent's expectation to his favorite lecturer and the intention to take the postgraduate entrance exam. Student C changed from the pressure of exams to the teaching method, ability improvement, and the postgraduate entrance exam. Student D changed from the pressure of exams to specific job requirements, ability improvement, and the postgraduate entrance exam.

The demotivation system also has dynamic characteristics. The demotivation of Student A changed from the voluntary swap and a challenging class to jobs connected with other domains, online class mode, and a challenging class. Student B changed from a challenging class and lack of interest to his effort in another domain and difficult classes. Student C changed from the tricky exam mode to interest in another domain. Student D had the demotivation because of one complex subject at first, and then he didn't have it in his later study.

Motivation and affordances

Social affordances

Different social affordances are given to the students throughout the entire academic program. However, different

perceptions and interpretations of the affordances lead to different initial conditions and attractor states.

The social affordance for Student A includes voluntary swap and employment requirements. This student was unwilling to major in English but became an English major because of a voluntary swap. This demotivated his study enthusiasm. However, his university stipulated that the top 10% of students in the school could have the opportunity to change their major. Encouraged by the policy and his strong wish to study in this area, he gained the motivation to study hard to change his major. In the second year, he began to worry about his future job because of the competitive job markets, so he had a more robust plan or self-imagination for the future than he did before. He had two directions in his plan: one was to have a solid plan to improve his ability in an effort to achieve this goal and another one was to attend the postgraduate entrance exam of other universities, which were better than his undergraduate college in securing good employment in the future. From this data, the attractor states identified are the pressure of exams and the wish to improve his ability.

For Student B, the social affordances are from his parent's wishes, the teaching method, and the postgraduate entrance exam. He felt that the expectancy from his parents forced him to study English, which required him to pass all of his exams. However, this affordance is not a positive one, and it did not become an attractor state further in his study. In the third year, he encountered an interesting lecturer and the teaching method used by this educator aroused his interest. This motivated Student B to study hard. At the same time, he had to prepare for the postgraduate entrance exam, which pushed him to work hard as well. The attractor states in this case are his favorite lecturer and his wish to become MTI or Master of Arts in English Linguistics.

Student C's social affordances are from the curriculum design, the summer internship, and the postgraduate entrance exam. In the first year, he tried to study hard, but the Fundamental English course was too difficult for him, demotivating him from learning English. However, this became the initial condition in his motivation system. The most significant change was during his summer vacation of the second year when he got the chance to do an internship. The job requirements in this position pushed him to work hard to work in the company he liked. In addition, he decided to prepare for the postgraduate entrance exam, and this became another motivation. In this case, the attractor states were his favorite lecturer, the intention to improve his performance, and the wish to pass the postgraduate entrance exam.

The social affordances of Student D are from the pressure of exams and job requirements. He had no specific goals in the first year, and his only motivation was to pass

his exams. The pressure of exams made him feel stressed on the one hand and it pushed him to study hard to pass the exams on the other hand. However, in the third year of his university life, he had solid goals for his plan. He had the intention to attend the postgraduate entrance exam and find good employment. He had a strong sense of purpose. After clarifying his goal, he worked hard, and his motivation strengthened. He intended to become the MTI in his graduate college. He also mentioned that if he could find an excellent job in autumn recruitment, he would go to work directly. He had to improve his English ability to find desirable employment, strengthening his English learning motivation. In this case, the attractor states are the wish to pass postgraduates entrance exams, improve his ability and find employment.

Individual affordances

Individual affordances include students' agency and language proficiency (Ahn, 2016). For example, Student A was unwilling to major in English but became an English major because of a voluntary swap. He wanted to change his major, and the related policy made it possible for him to do so while sustaining his motivation to work hard. Student B found the fundamental English class difficult and had trouble remembering many concepts. As a result, he failed the Fundamental course in the first semester, which frustrated him and weakened his motivation for learning. The lack of interest and complexity of content temporarily influenced the motivational trajectory. Student C felt pressure from his peers in the internship company, which alarmed him and pushed him to work hard. Student D had trouble in the Fundamental English class because the class was too dull for him. As a result, he failed the course twice, which affected his motivation trajectory.

Language proficiency may be viewed as another exemplar of individual affordance in the study that informed changes in students' motivation during the completion of their programs. For example, Student A had firm English basic knowledge before entering university and his capabilities in this area made him confident in studying English and strengthened his motivation. Student B had a weak foundation in English, which frustrated him and weakened his motivation. Student C tried to study hard, but he was not persistent enough, an internal factor that affected his motivation. The Fundamental English course was too difficult for him and the difficulty of the exams weakened his motivation. This internal factor combined with the curriculum demotivated him in his study. Student D had no specific goals in the first year, and the only motivation was to pass the exams. The pressure of exams made him stressed, but it pushed him to study hard.

Discussion

As Fig. 4 shows, the nature of these male learners' motivation is complex; the internal and contextual factors influence each other, and they exert an impact on the agent. In addition, affordance serves as the intervention to affect the change of motivation.

Complex nature of learner motivation

When the male students first came to the university as freshmen, few of them were willing, and nearly half of the students became English majors because of a voluntary swap. The first year's curriculum focused on improving students' basic skills, reciting and accumulating words and phrases, and increasing the knowledge reserve of learners, so the examination mode and teaching method were more stringent. The curriculum of the first year suppressed the enthusiasm of students. As a result, male students' main motivation to learn English was to pass the exam. This pressure of exams had a duality of influences; it pushed students to study but reduced the enthusiasm for student learning. The study saw it as motivation instead of demotivation because male English learners looked for the exams, although they did not like them (Pan & Gauvain, 2012).

By the third year, the curriculum added more challenging classes, such as listening and literature, in which male students experienced difficulty. Their English learning enthusiasm waned, and their motivation to learn English weakened (Shu, 2022). However, the third-year curriculum also includes advanced English. The content of Advanced

English was more flexible, and the lecturer had an exciting and humorous way of teaching, which stimulated the male students' interest in learning. To some extent, this reconciles the weakening of the learning motivation of male students in English majors (Gao & Wang, 2022). The inherent variability of employment expectations also influenced the learning motivation of male students (Rosiak, 2023). When male students first entered the university, there was no employment pressure, and few of them considered their future studies or employment. As a result, they lacked motivation brought on by future employment. In their junior year, male students began to have employment pressure, so they began to consciously improve their ability to prepare for postgraduate exams and job hunting. Their English learning motivation was enhanced. Another popular way for learners to further their studies and practice their skills is to study abroad, but due to the outbreak of COVID-19, most participants did not have this as a viable option (Zhang & Hasim, 2023).

Most male English majors chose to further their education by postgraduate entrance exams; in this case, they preferred to change their majors because they thought it was hard for English majors to find good jobs. They thought the job market for English majors provided limited but competitive positions (Dégi & Kovasch, 2021). They preferred to change majors when entering postgraduate entrance exams, for which their English learning motivation was weakened (Reilly, 2020). The process is influenced by the interactions between internal factors, such as students' free will, their goals for learning, personality, and contextual factors, such as academic affordance and competitive job markets.

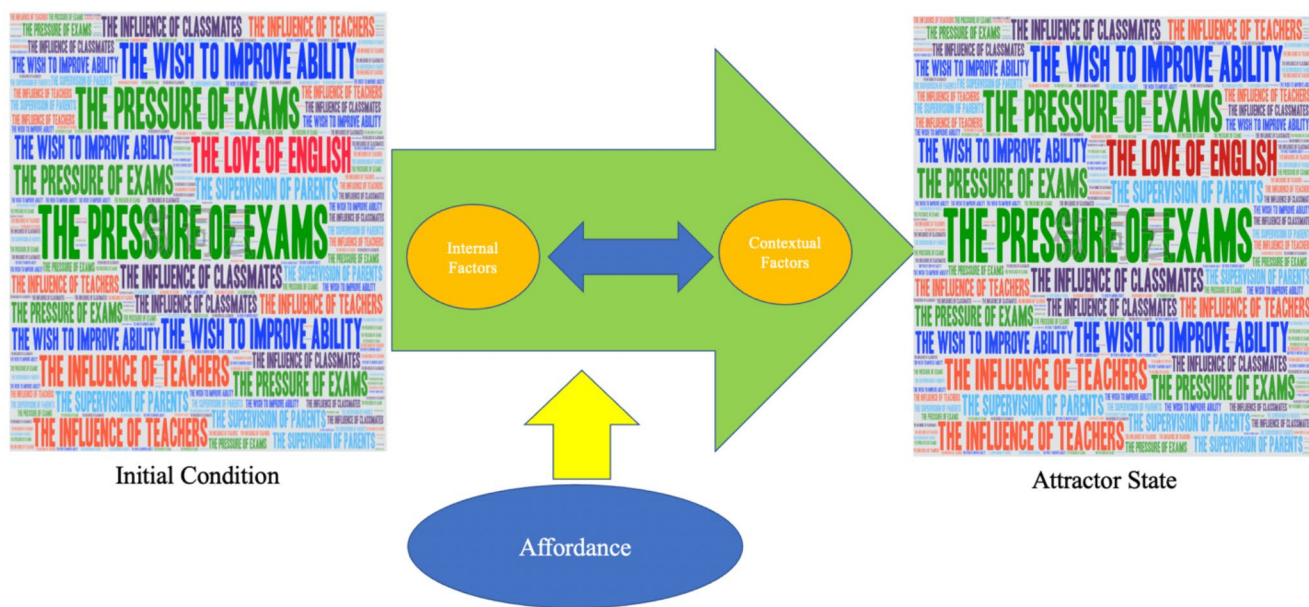


Fig. 4 The framework of male learner motivation

Factors did not work apart but connectedly, pushing their motivation to fluctuate.

Co-evolution of initial conditions and attractor states

From the findings, we can observe significant differences between individuals' conditions and attractor states in each case and the group as a whole. The internal and contextual factors influenced each other and impacted the agent, pushing the motivational trajectories to change.

Findings show that the initial situation changed to the attractor state due to interactive cooperation between internal and contextual factors (Wang et al., 2022). The internal factors mainly include the interest in English and the wish to have better employment in the future while the contextual factors mainly include academic affordance and competitive job markets. These factors did not influence the motivational trajectory separately but because of the interaction between the factors.

The individual motivational systems worked similarly, but the patterns and trajectories were more detailed. The four students had complex factors which led to the attractor state. The factors of Student A mainly included weak self-control, the policy of the nation and college, the mode and difficulty of curriculum and exams, the mode of teaching, social environment, family economic status, and the job market. The factors of Student B mainly included their wish to improve their English performance, his interests in other domains, the lecturer, the difficulty of the curriculum, and the job market. The factors of Student C included the difficulty of curriculum, the lecturer, his summer internship, and the job market while the factors of Student D included the wish to improve his performance, the job market, and his strong desire to have a good job. The motivation systems of each student had a detailed timescale due to these differences in factors. Though the four individuals came to a stable motivation state simultaneously, there were slight differences. Students A and C arrived at their attractor states by the end of the second year. However, Students B and D settled into their attractor states during the first semester of the third year. Even while studying in the same class, the four students had different influences on their academic affordances (Kember, 2016).

Affordances as an intervention

From the focus group interview, five ecological affordances were observed: national policy, parents' wishes, teaching methods, and peer pressure. These affordances serve as a tool to affect the motivation to study.

While the affiliate and university policy in the research site allowed students to change their major, only top-performing students were able to take advantage of this policy. Students who wished to take advantage of this opportunity needed to work hard to become the top students in their respective universities. For example, Student A was unwilling to major in English but became an English major because of a voluntary swap, which demotivated his study enthusiasm. However, upon learning that the national policy stipulated that only the top 10% of students in the school could have the opportunity to change their major, he studied hard to enter his chosen field of study. In this case, policies can be an effective tool to improve some students' motivation.

Parents' wishes, in this case, reflect the decision-making of parents to choose a major for their children. In China, many students choose their major based on parental preferences rather than basing their decision on their own interests (Leung et al., 2011). In this perspective, we find that the parents' wish to choose the major may not be a positive affordance, but it may increase student motivation. For example, Student B had no interest in English study, which to some degree, weakened his study motivation. After entering university, however, this changed. His goal was to pass his exams at the university. In pursuit of achieving his goal, his motivation strengthened to some degree.

The teaching methods referred to here describe how lecturers impart knowledge in their students. If lecturers use appealing methods in the classroom, they can arouse interest in student learning (Wang et al., 2022; Esra & Sevilen, 2021). This can be an excellent tool to improve students' motivation. For example, Student C thought his translation lecturer had an efficient teaching method, and the atmosphere in class was enjoyable and relaxing. The gentle way of teaching made him more interested in his English major.

Peer pressure from top-performing peers may also give students the motivation to work hard (Golsteyn et al., 2021; Wu, 2019). For example, Student C interned during the summer holiday, and this experience made him realize that his capabilities were inadequate in the current job market. As a result, his motivation to do well and increase his skills increased and he was encouraged to study hard. Likewise, the job requirements to enter the internship program was high and required a high GPA. To be admitted to his favorite company, Student C studied hard to meet the criteria. He was also determined to pass his postgraduate exams because he discovered that 80% of the staff at that company were postgraduates.

Conclusion

This paper explored the motivation of male students in English majors from a complex dynamic system theory perspective. The findings from the data demonstrate that the initial situation of the students changed to the attractor states due to interactive cooperation between internal and contextual factors, which reflects the complexity of motivation systems. Secondly, findings show that complex factors led to the attractor states. In the motivation system, one initial condition may not result in a specific attractor state, which shows the non-linearity in the motivation system. Lastly, findings show that the learning motivation of the four students changed in the motivation system during the four years, which shows the dynamicity of motivation systems.

Apart from the theoretical implications mentioned above, we also offer some practical insights to lecturers. Specifically, we noticed that lecturers' appropriate analysis and interpretation of academic affordance may help male students enhance their motivation to study in a course or program. In this study, we investigated male students, learning in a female student-dominated major. These students displayed different kinds of demotivation, anxiety, and even depression during their programs. Some courses that students considered challenging also weakened students' motivation to learn. Lecturers' efforts in designing these curricula and adjusting the curricula to the male students' ability levels and including areas of interest may improve students' engagement in class. In addition, lecturer development, including pedagogy, mentoring, professional training, and reflective practices, is vital in strengthening student motivation (Derakhshan et al., 2023; Gao & Wang, 2022; Wang & Derakhshan, 2023). It is suggested that lecturers hold regular reflective practice workshops or seminars to share and discuss their learning to ensure 'best' practices.

Although this study has a small sample size, the participants highlight important aspects of English major education for male students. To increase male enrollment in English majors, universities and programs should work to ensure the learning motivation of this student population from the outset of study, making it an attractive subject of study. Further work is needed in this area with a larger group of participants to establish how motivation changes in different periods throughout study, what programs can be implemented by universities to attract male students and, identify what kind of support is needed by male students throughout their study period. This further research will help to ensure that male students, in China and elsewhere, have the equality of opportunity to study in their programs of choice, including in traditionally female-dominated subjects.

This study also has certain limitations. Firstly, the research subjects were all from the same technical institute,

which may lead to a certain deficiency in sample diversity. Each academic institution possesses its unique culture, curriculum, and student demographics, which could influence the research outcomes. Consequently, the results may not be fully representative of the broader population or applicable to other educational settings, such as universities with different academic disciplines or institutions from diverse socio-cultural backgrounds. Secondly, since this study primarily relies on qualitative analysis, there may be limitations in terms of sample size. Although smaller sample sizes can yield rich and detailed information, they may not fully capture the breadth and diversity of perspectives present in a larger population.

In the future, scholars can address the identified limitations through the following directions to fill the gaps in research. Firstly, they can enhance the diversity of the sample by selecting male English language learners from various regions and different types of higher education institutions. This approach will contribute to a more representative and comprehensive study. Secondly, scholars can increase the sample size by expanding the number of participants and incorporating quantitative methods to capture an overall understanding of male English language learners' characteristics.

Funding This study was primarily funded through Foreign Language Teaching and Research Committee, China Association of Higher Education (Grant No. 21WYJYZD04), 2021. It was primarily sponsored by the Xi'an Jiaotong University Talents Plan.

Declarations

Conflict of interest The authors declare that no conflict of interest has been involved in the submitted work. All the data are provided as requested, and all the references are appropriately cited.

Ethical approval All procedures performed in the study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

References

- Ahn, T. (2016). Learner agency and the use of affordances in language-exchange interactions. *Language and Intercultural Communication*, 16(2), 164–181. <https://doi.org/10.1080/14708477.2015.1125911>.
- Al-Hoorie, A. H. (2017). Sixty years of language motivation research: Looking back and looking forward. *SAGE Open*, 7, 215824401770197–215824401770111. <https://doi.org/10.1177/2158244017701976>.
- Al-Hoorie, A. H., & MacIntyre, P. (2019). *Contemporary Language Motivation Theory: 60 Years Since Garner and Lambert (1959)*. Bristol: Multilingual Matters.
- Allen, H. W. (2010). Language-learning motivation during short-term study abroad: An activity theory

- perspective. *Foreign Language Annals*, 43(1), 27–49. <https://doi.org/10.1111/j.1944-9720.2010.01058.x>.
- Al-Mahrooqi, R., & Denman, C. (2014). Motivation within the Omani EFL context: Types, sources and classroom implication. *Journal of Teaching and Education*, 3(2), 103–120. <https://doi.org/10.1111/j.1467-9922.2012.00719.x>.
- Aronin, L., & Singleton, D. (2012). Affordances theory in multilingualism studies. *Studies in Second Language Learning and Teaching*, 2(3), 311–331. <https://doi.org/10.14746/ssl.2012.2.3.3>.
- Campbell, E., & Storch, N. (2011). The changing face of motivation: A study of second language Learners' motivation over time. *Australian Review of Applied Linguistics*, 34(2), 166–192. <https://doi.org/10.1075/ara.34.2.03cam>.
- Cohen, L., Manion, L., & Morrison, K. (2011). *Research methods in education* (7th ed.). Routledge.
- Derakhshan, A., Wang, Y., Wang, Y., & Ortega Martín, J. L. (2023). Towards innovative research approaches to investigating the role of emotional variables in promoting language teachers' and learners' mental health. *International Journal of Mental Health Promotion*, 25(7), 823–832. <https://doi.org/10.32604/ijmhp.2023.029877>.
- Dégi, Z., & Kovasch, O. (2021). English language learning motivation of students at the sapientia hungarian University of Transylvania in Miercurea Ciuc. *Journal of Education Culture and Society*, 12(2), 567–582.
- Dincer, A., & Yesilyurt, S. (2017). Motivation to speak English: A self-determination theory perspective. *PASAA: Journal of Language Teaching and Learning in Thailand*, 53, 1–25.
- Duff, P. A. (2014). Case study research on language learning and use. *Annual Review of Applied Linguistics*, 34, 233–255. <https://doi.org/10.1017/S0267190514000051>.
- Elena, M. G. (2014). Language learning motivation: A look at the additional program. *Social and Behavioral Sciences*, 152, 1137–1142. <https://doi.org/10.1016/j.sbspro.2014.09.289>.
- Esra, M. E. E., & Sevilen, Ç. (2021). Factors influencing EFL students' motivation in online learning: A qualitative case study. *Journal of Educational Technology and Online Learning*, 4(1), 11–22.
- Freeman, D. L., & Cameron, L. (2008). Research methodology on language development from a complex systems perspective. *The modern language journal*, 92(2), 200–213.
- Gao, Y., & Wang, X. (2022). Towards understanding teacher mentoring, learner WCF beliefs, and Learner Revision Practices through peer review feedback: A sociocultural perspective. *Journal of Language and Education*, 8(4), 58–72.
- Gardner, R. C. (1985). *Social psychology and second language learning: The role of attitudes and motivation*. Arnold.
- Gardner, R. C., & Lambert, W. E. (1972). *Attitudes and motivation in second language learning*. Newbury House Publishers.
- Gibson, J. J. (1977). *The theory of affordances*. Hilldale, USA, 1(2), 67–82.
- Golsteyn, B. H., Non, A., & Zölitz, U. (2021). The impact of peer personality on academic achievement. *Journal of Political Economy*, 129(4), 1052–1099.
- Good, J. (2007). The affordances for social psychology of the ecological approach to social knowing. *Theory and Psychology*, 17(2), 265–295.
- Guo, W., Bai, B., Zang, F., Wang, T., & Song, H. (2023). Influences of motivation and grit on students' self-regulated learning and English learning achievement: A comparison between male and female students. *System*, 114, 103018.
- Guo, Y., Wang, Y., & Ortega-Martín, J. L. (2023). The impact of blended learning-based scaffolding techniques on learners' self-efficacy and willingness to communicate. *Porta Linguarum Revista Interuniversitaria de Didáctica de las Lenguas Extranjeras*, (40), 253–273.
- Hamilton, L., & Corbett-Whittier, C. (2012). *Using case studies in education research*. Sage.
- Heft, H. (2001). *Ecological psychology on context: James Gibson, Roger Barker, and the legacy of William James's radical empiricism*. Erlbaum.
- Kam, A. H., & Umar, I. N. (2023). Fostering autonomous motivation: A deeper evaluation of gamified learning. *Journal of Computing in Higher Education*, 1–21.
- Kember, D. (2016). *Understanding the nature of motivation and motivating students through teaching and learning in higher education*. Springer.
- Kim, J., & Doo, M. Y. (2022). The Effects of Motivation, Career decision-making Self-Efficacy, and Self-Regulation on Learning Engagement of Junior College Students. *Journal of College Student Development*, 63(4), 432–448.
- Lamb, M. (2012). A self-system perspective on young adolescents' motivation to learn English in urban and rural settings. *Language learning*, 62(4), 997–1023. <https://doi.org/10.1111/j.1467-9922.2012.00719.x>.
- Larsen-Freeman, D. (2019). On language learner agency: A complex dynamic systems theory perspective. *Modern Language Journal*, 103(1), 61–79. <https://doi.org/10.1111/modl.12536>.
- Leung, S. A., Hou, Z. J., Gati, I., & Li, X. (2011). Effects of parental expectations and cultural-values orientation on career decision-making difficulties of Chinese University students. *Journal of Vocational Behavior*, 78(1), 11–20. <https://doi.org/10.1016/j.jvb.2010.08.004>.
- Li, L. (2013). A study on internal factors of Chinese College EFL Learners' demotivation. *Journal of PLA University of Foreign Languages*, 36(2), 65–69.
- Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. *International journal of qualitative methods*, 16(1), 1609406917733847.
- Pan, Y., & Gauvain, M. (2012). The continuity of college students' autonomous learning motivation and its predictors: A three-year longitudinal study. *Learning and Individual Differences*, 22(1), 92–99.
- Pan, Z., Wang, Y., & Derakhshan, A. (2023). Unpacking Chinese EFL students' academic engagement and psychological well-being: The roles of language teachers' affective scaffolding. *Journal of Psycholinguistic Research*, 1–21.
- Papi, M., & Hiver, P. (2020). Language learning motivation as a complex dynamic system: A global perspective of truth, control, and value. *Modern Language Journal*, 104(1), 209–232. <https://doi.org/10.1111/modl.12624>.
- Park, A. S., & Ko, E. (2017). Influences of rehabilitation motivation, self-efficacy, and family support on rehabilitation adherence in stroke patients. *Journal of Korean Biological Nursing Science*, 19(2), 113–122. <https://doi.org/10.7586/jkbns.2017.19.2.113>.
- Reilly, P. (2020). The development of Student Motivation to learn English at a University in Mexico. *International Journal of Instruction*, 13(3), 401–416.
- Rosiak, K. (2023). The role of language attitudes and ideologies in minority language learning motivation: A case study of polish migrants'(de) motivation to learn Welsh. *European Journal of Applied Linguistics*, 11(1), 26–52.
- Samad, A. A., Etemadzadeh, A., & Far, H. R. (2012). Motivation and language proficiency: Instrumental and integrative aspects. *Procedia-Social and Behavioral Sciences*, 66, 432–440. <https://doi.org/10.1016/j.sbspro.2012.11.287>.
- Scherer, K. R. (2001). In N. J. Smelser, & P. B. Baltes (Eds.), *The psychological structure of emotions and* (pp. 4472–4477). Pergamon Press. International Encyclopedia of the Social & Behavioral Sciences

- Shu, J. (2022). A POA theory-based network teaching mode for English course in higher vocational college. *International Journal of Emerging Technologies in Learning (iJET)*, 17(1), 224–238.
- Tobin, G. A., & Begley, C. M. (2004). Methodological rigour within a qualitative framework. *Journal of advanced nursing*, 48(4), 388–396.
- van Lier, L. (2000). From input to affordance: Social-interactive learning from an ecological perspective. In J. Lantolf (Ed.), *Socio-cultural theory and second language learning* (pp. 245–259). Oxford University Press.
- Wang, X., Sun, F., Wang, Q., & Li, X. (2022). Motivation and affordance: A study of graduate students majoring in translation in China. *Frontiers in Education*, 7, 1010889. <https://doi.org/10.3389/educ.2022.1010889>.
- Wang, Y., & Derakhshan, A. (2023). Enhancing chinese and iranian EFL students' willingness to attend classes: The role of teacher confirmation and caring. *Porta Linguarum*, 39(1), 165–192.
- Wang, Y., & Guan, H. (2020). Exploring demotivation factors of Chinese learners of English as a foreign language based on positive psychology. *Revista Argentina de Clinica Psicologica*, 29(1), 851.
- Wang, Y., Pan, Z., & Ortega-Martín, J. L. (2023). The predicting role of EFL Students' achievement emotions and technological self-efficacy in their technology acceptance. *The Asia-Pacific Education Researcher*, 1–12.
- Waninge, F., Dörnyei, Z., & de Bot, K. (2014). Motivational dynamics in language learning: Change, stability, and context. *The Modern Language Journal*, 98(3), 704–723. <https://doi.org/10.1111/modl.12118>.
- Wu, Z. (2019). Academic motivation, engagement, and achievement among college students. *College Student Journal*, 53(1), 99–112.
- Zhang, S., & Hasim, Z. (2023). Perceptions and coping strategies in English writing among chinese study-abroad graduate students. *SAGE Open*, 13(3), 21582440231184851.
- Zheng, Y., Lu, X., & Ren, W. (2020). Tracking the evolution of chinese learners' multilingual motivation through a longitudinal Q methodology. *The Modern Language Journal*, 104(4), 781–803. <https://doi.org/10.1111/modl.12672>.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.