
Language Learning Motivation as a Complex Dynamic System: A Global Perspective of Truth, Control, and Value

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Research on language learning motivation has typically focused on the strength of different motives in isolation and often out of context. The present study aims to explore the applicability of one global framework of motivation to integrate different perspectives. We investigated how adaptive interactions between learners' motivations for value, truth, and control effectiveness, and contextual factors led to varying motivational trajectories and patterns of emergent stability at different stages of the language-learning experiences of 6 Iranian graduate students learning English in the United States. Using a retrospective-longitudinal design, quasi-narrative accounts of key phases of the learners' language-learning histories were documented through interviews. These data were analyzed following an analytic inductive approach to identify the main events within different contexts, themes associated with each setting, and other bottom-up conceptual categories. Using a process-tracing procedure our results showed that dynamic processes and adaptive or competitive interactions between value-, control-, and truth-related motivations and the context in which they emerged resulted in specific motivational trajectories that shaped these learners' language-learning choices and experiences. We discuss the contribution of these novel frameworks for understanding the complex motivational development of language learners.

Keywords: L2 motivation; complex dynamic systems; process tracing; study abroad; value; truth; control

OVER SIX DECADES OF RESEARCH ON THE topic of second language learning (L2) motivation (Al-Hoorie, 2017; Dörnyei & Ryan, 2015) has been based on a variety of theoretical lenses. These include Gardner's socioeducational theories of motivation (Gardner, 1985; Gardner & Lambert, 1972); Dörnyei's framework of motivational components (Dörnyei, 1994), task motivation (Dörnyei, 2003), a process-oriented model (Dörnyei & Ottó, 1998), the L2 motivational self system (Dörnyei, 2005), and directed motivational currents (Dörnyei, Henry, & Muir, 2016);

and Noels's application of self-determination theory (Noels, 2001; Noels et al., 2000). While each of these theories explores various dimensions of motivation, they are limited in scope, present a reduced view of the individual as an L2 learner, and treat motivation as linear links between motives as variables.

If the goal of L2 motivation research, however, is to understand the motivational dynamics of language learners as whole persons situated within a broad and dynamic social context, a comprehensive theoretical basis has to account for how different L2 motivational constructs are shaped within and interact with the general motivational context, and how the collective outcome of these interactions might shape language learning behavior. Doing so can allow scholars to explain the motivational particularities of learners

as “real persons, rather than (...) as theoretical abstractions” (Ushioda, 2009, p. 220) and show how L2 development can interact with and contribute to a broader whole of human activity (Larsen–Freeman, 2019). In the current study, we propose a first step by merging and broadening the scope of the motivational frameworks used in the literature. To this end, we first consider the wider picture of learners’ motivational profiles and then zoom in to understand how learners’ motivations for language learning fit within the broader context, and how that context forms and interacts with those motivations.

Furthermore, since Dörnyei’s (2008, 2009a) proposal to rethink L2 motivation using a complexity and dynamic systems theory (CDST) framework, advances in the field have come to reflect the way L2 motivation interacts with the environment through a complex interplay of synchronic and diachronic variation (Dörnyei & Ryan, 2015). In the conclusion to the first volume devoted to examining motivational dynamics in the field, MacIntyre, Dörnyei, and Henry (2015) stated that “motivation has adaptive and self-organizing properties, with feedback loops that continuously integrate internal and external contexts and act as reinforcing or counteracting forces, creating nonlinear changes in levels of motivated behavior” (p. 423). These principles are echoed by scholarship on language development and in learning more generally (e.g., Lowie & Verspoor, 2015; van Geert, 2011; van Geert & Steenbeek, 2014) and signal a growing momentum for a novel reorientation to the way in which applied linguistics scholars see, investigate, and intervene in the language learning process.

Given the need for a more developmental orientation in studying the learning activities of individuals in learning communities, as well as applying a more global perspective that features L2 motivation interacting with domain-general dimensions, in the current study we adopt a CDST perspective of L2 motivation using Higgins’s (2014) global framework of human motivation for effectiveness. Our objectives in this study are to build on research adopting individual, situated, and dynamic designs that allow an explicit focus on temporal and contextual variation (Hiver & Papi, 2020) and to explore the applicability of Higgins’s (2014) global framework of motivation to account for the emergence of language-learning motivation.

HIGGINS’S CONCEPTUAL FRAMEWORK OF MOTIVATION

The lack of consensus and theoretical intelligibility alluded to earlier is not unique to L2 motivation research. Motivation researchers in the field of psychology have also grappled with similar issues. As part of the initiative to overcome this historical problem in the study of human motivation, Higgins (2014) has proposed a tripartite conceptual framework with the capacity to integrate various motivation theories, pulling them together in a unified framework that provides a persuasive answer to the historical question of what people want. According to Higgins (2014), this theoretical framework goes beyond the hedonic principle (i.e., the motivation to approach pleasure and avoid pain) by accommodating various dimensions of motivation which not only are used to explain what motivates human beings in general but also underlie many individual and social characteristics including personality and cultural differences.

The basic tenet of Higgins’s model is that *effectiveness* is generally what humans desire. The fundamental motivation for what humans do is the desire to be effective with respect to three basic motives: value, truth, and control. “People want to be effective at having desired outcomes (value), but they also want to be effective at establishing what’s real (truth) and managing what happens (control)” (Higgins, 2014, p. 14).

Drawing on existing research in the field of psychology and his own extensive research at the Motivation Science Center at Columbia University, Higgins argued that one or more of these three dimensions are emphasized to varying degrees in different theories of motivation. He emphasized that these three dimensions do not usually function separately in order to be motivational; in fact, it is what he calls the “organization of motives” that is the core of how motivation works. In other words, the structural organization of value, truth, and, control preferences directs individual choices in any goal pursuit. Motivation, thus, is defined as having preferences that direct choices. “What it means to be motivated is always an integration of preferences from different regulatory levels whose resultant state directs a choice” (Higgins, 2014, p. 25). Here we describe the three dimensions of Higgins’s theoretical framework: value effectiveness, control effectiveness, and truth effectiveness.

Value effectiveness is defined as “being successful in having what’s desired” (Higgins, 2014,

p. 49). It is concerned with success in achieving desired end-states or outcomes including benefits versus costs, pleasure versus pain, and biological needs. Value concerns what one wants to end up with regardless of how they want to bring about this outcome. Values can be achieved individually or through collaboration or proxies, and through hard work or without difficulty. This aspect of human motivation has been the focus of the drive and goal theories in the field of motivation. The anticipation of success or failure in achieving a goal (e.g., winning a race) or in satisfying a drive (e.g., hunger) are examples of values that can have this motivational force. In L2 motivation research, constructs such as future selves and instrumental motives fall under this category.

Control effectiveness is concerned with “being successful in managing what happens” (Higgins, 2014, p. 53). “Control effectiveness is about the level of competence, self-efficacy, personal causation, and autonomy that are experienced while carrying-out the goal pursuit process, before there are any desired results at the end” (p. 54). The motive for control effectiveness can be strong enough and motivate people independently of the value and truth motives. For instance, people who risk their lives in extreme sports without any concerns about the potential costs or benefits of such pursuits are highly motivated through the control dimension. The intrinsic motivation for language learning is a typical example of this type of motive.

Truth effectiveness is defined as “being successful in establishing what’s real” (Higgins, 2014, p. 51). This dimension of motivation deals with the desire to gain knowledge of the outside world. This knowledge can range from the most basic facts about the world (e.g., a wild hungry tiger will eat you) to the most complex questions one can answer (e.g., What is the meaning of life?). The desire to know the universe without concern for the benefits or costs associated with it represents truth effectiveness, which is reflected in some theories of motivation to different degrees. Higgins argues that truth is independent of but related to all values and all the ways people pursue goals. People want to know about the reality of the values and goals they pursue (truth-value), how well they are doing in the course of the pursuits (control), the truth of their abilities (truth-control), and the accuracy and appropriateness of their methods for achieving those values (truth-control). These represent the truth dimension in relation to the value and control dimensions. Learners’ desires to learn about the target language, culture, or community without any regard for their utilitarian

value are examples of L2 motives that fall under this category.

Despite the fact that these three dimensions of motivation can act separately as strong motivators, throughout this manuscript we advance the position that in the reality of human and social endeavors, such as language learning, the resultant motivational state of an individual is in many instances an outcome of the interactions between these three dimensions and context over time. That is, depending on the dynamic interactions between the system (i.e., the individual) and the context, the three dimensions of motivation can promote or downgrade each other and produce different motivational outcomes. We turn now to situating our study within the lens of CDST, and detail how this reorientation to the way scholars see, investigate, and intervene in the L2 motivation landscape provides a set of powerful abstractions that further our understanding of the motivational dynamics that underpin language learners’ behavior (Dörnyei, 2017; Hiver & Larsen-Freeman, 2020; Hiver & Papi, 2020).

A COMPLEX DYNAMIC FRAMEWORK FOR L2 MOTIVATION RESEARCH

As our introduction highlights, L2 motivation has come to be conceptualized in ways that emphasize its situatedness and context dependence but which, with some exceptions, tend to discount its adaptive and dynamic nature and overlook what the temporal dynamics of events at a smaller level of granularity might reveal about global developmental processes in the language learners’ whole motivational trajectory. Using Higgins’s global motivational dimensions reviewed previously, and borrowing from a recent practical blueprint that informs the planning and design of CDST research (Hiver & Al-Hoorie, 2016), here we outline and articulate the conceptual considerations which guided us in the design of this study. Table A1 (see Appendix A) defines these terms and considerations.

Operationalizing a Complex System in Context

Complexity research invites empirical investigation on how parts of the whole relate to each other, and also encourages a more organic conceptualization of L2 motivation as an adaptive, *soft-assembled* (i.e., constrained more by contextual affordances and task demands) dynamic unit of analysis—a complex adaptive system (see also van Geert & Steenbeek, 2014). Complex adaptive systems are systems that adapt, evolve, and

learn in the process of interacting with dynamic environments (Holland, 2012). They allow us to understand how simplicity emerges from complex interactions. And, because the phenomena of interest in motivation for language learning do not ride on any single element or isolated parameter (Dörnyei & Kubanyiova, 2014), complex systems can be considered the object of interest or fundamental unit of analysis in language-learning research that adopts this perspective (Hiver & Larsen-Freeman, 2020; Hiver & Papi, 2020). Applied to Higgins's global dimensions (i.e., value, truth, control), motivational landscapes and behavioral patterns can vary depending on the specific content of these three dimensions, the interplay between them, and the context in which language learning is situated. In line with this existing work, we see complex systems as phenomenologically real cases situated in context (Hiver & Al-Hoorie, 2016). For the purpose of this study, we take language learners' motivational development as the complex adaptive system under investigation, with these three aforementioned general dimensions constituting potential specific motives and the individual learner as the adaptive agent. Language learners' deliberate learning behaviors and tangible experiences in language-learning communities are what give this system phenomenological validity. Using such a unit of analysis in conjunction with the temporal perspective we adopt, our objective is to develop a logic of explanation that is complex (i.e., multifaceted and interrelated) and dynamic (i.e., involving contingent, adaptive processes; Han & Hiver, 2018).

Dynamic Processes and Emergent Outcomes

A particular added value of a complexity perspective for the study of L2 motivation is its explicit focus on time and its emphasis on processes of change and development at various timescales (Elman, 2003). Adaptation through time at the macro level (i.e., the "whole" system) is based on the local adaptive behavior of the system's constituents and is characterized by self-organization and emergence—novel and coherent patterns and properties that arise during the process of self-organization (van Geert, 2011). Regarding the elicitation and analysis of specific components within each of Higgins's (2014) motivational dimensions, we chose to use a temporal perspective that traces adaptive processes through a motivational trajectory for the learners across periods of learning. This level of granularity was captured by eliciting learners' learning histories and exam-

ining events that occurred in the course of coherent windows of time (i.e., middle school, secondary school, college, and graduate school) and were an indicative example of congruent trends on adjacent times periods (de Bot, 2015; Lemke, 2000). We traced the L2 learning histories of these individuals in order to investigate the role that the initial conditions and distributed adaptations played in learners' processes of becoming (Verspoor, 2015). This somewhat unconventional position for examining language learner motivation (i.e., as a dynamic trajectory) was influenced by the desire to explore the general dimensions and specific mechanisms of adaptation that are present in the system, and trace trajectories the learners have followed in getting to where they are (see also Waninge, Dörnyei, & de Bot, 2014). At this particular level of granularity, individuals' pathways of change self-organize (see also Lowie & Verspoor, 2015) and are characterized by nonfinality as what appears to be an end point in L2 motivation or development is just one of many relatively stable points in an ongoing and dynamic trajectory within the state landscape (Rose, Rouhani, & Fischer, 2013). We traced how the participants moved through different periods of self-organized criticality—critical threshold points at which small adaptations can significantly alter the equilibrium or the development of a system¹—as their goals were redefined, reorganized, and coordinated depending on the structures and demands of different contexts. Thus, of particular interest for our study are the pockets of stability and patterned outcomes (i.e., attractor states) into which the learners settled in the motivational landscape (Hiver, 2015; Hiver & Al-Hoorie, 2020).

Adaptive Interactions of System Components

Complex adaptive systems constantly reorganize their internal working parts and adapt themselves to the problems posed by their surroundings. For this reason, learners' agentic adaptations that come about through interaction with their environment are a pivotal characteristic of seeing motivation from the complexity perspective (Larsen-Freeman, 2019). This coordinative structure—that is, the relationship of local system components coupled to the environment (Kelso, 2014)—shows that an agent and the environment are not two separate things each with their own properties, but rather one single co-evolving system. One example of a coordinative structure is how humans coordinate body posture and gaze patterns during conversation. Honing

in on this interaction of components allows researchers to value variation as strongly as stable states and to think in a connected way about both outcomes and their processes (Larsen–Freeman, 2013, 2017). Through their experience in context, complex adaptive systems—in this case, learners—come to anticipate the consequences of certain relationships and seek to adapt to changing circumstances. Of interest for our study were the ways in which the learners co-adapted with the contexts they were embedded in through the interactions of prominent system components (i.e., specific content of the dimensions of value, truth, and control), and how learner behavior depends on multiple factors that overlap and interact interdependently, with some factors in the system playing a larger role at certain times but not at others (Overton & Lerner, 2014). These adaptive interactions—termed coordination dynamics—shed light on how functionally significant patterns of coordinated behavior emerge from initial states, persist in context, and adapt or change through time (Jirsa & Kelso, 2004). While the sustained adaptation of systems is capable of producing a rich repertoire of behaviors (Lowie & Verspoor, 2015, 2019), it also illustrates how simplicity arises from the adaptive behavior of interrelated and interacting components. Coordination dynamics are precisely what enables learners to accommodate such waxing and waning influences over time (Lowie & Verspoor, 2015). Using process tracing, in this study our aim was to uncover key motivational trajectories and processes of development and highlight the unique coordination dynamics that lead to salient motivational outcomes for these language learners.

Context of Study

The participants of this study were all born and raised in Iran until they moved to the United States for their doctoral studies. Their shared experiences and background inform their responses and participation in this study. Iran has a population of approximately 83 million, the majority of whom identify as Shia Muslims, and has been at the center of many political controversies. More prominently, in 1979, Iran underwent a political revolution against a monarchy ruled by Pahlavi kings and transitioned to the Islamic Republic of Iran (IRI). Due to U.S. involvement in the 1953 coup d'état against the Iranian democracy (Bryne, 2013) and U.S. support for Iraq's invasion of Iran (1980–1988), the IRI has adopted an anti-American and anti-imperialist narrative using an Islamic and Shia-inspired political philosophy,

which in turn has resulted in severe U.S.-led sanctions on Iran's economy. These economic sanctions, and the domestic mismanagement of the country's resources, have had a negative impact on the Iranian economy and welfare, which are among the main themes that participants in the present study mentioned as contributing to their decisions to leave the country. Given its conservative political philosophy, the IRI has also employed controversial restrictions on social norms. The combination of the economic problems and social restrictions has led many young, educated, and liberal-minded Iranians to leave the country for a better education and/or life in Western countries that enjoy more desirable socioeconomic conditions. With approximately 150,000 educated Iranians leaving the country every year (International Monetary Fund, 2015), Iran is one of the nations in which brain drain is most prevalent.

In Iran's educational system, students start official schooling when they are 7 years old. After 5 years of primary school, they attend middle school for 3 years and then high school (i.e., upper secondary) for 4 years. Students start learning English in the second year of middle school at about age 13 and have 2–3 hours of English instruction per week until they finish high school. They can then take part in a very competitive public college entrance exam, known as the *Konkour*. The higher students rank on the exam, the better their chances of gaining admission to top universities. Although English does not constitute a significant part of the undergraduate college entrance exam, it is an important part of admission into higher level graduate programs, especially for a PhD. Without passing the English requirements, one is not allowed to take the PhD entrance exam. If male applicants are not admitted to college, they must immediately complete 2 years of obligatory military service to be eligible for employment and travel abroad. College graduates can delay their military service for a second time if they are admitted to a master's program, and for a third time if they are admitted to a PhD program. Entrance into graduate programs requires taking another competitive exam. However, if individuals leave the country to complete a PhD overseas, they would have to submit a 15-million-toman bond (equivalent to about \$5,000 at the time of data collection) to guarantee their return to the country and enter the military service upon return. All six participants in this study chose to leave Iran for PhD programs in the United States after posting a 15-million-toman bond to return to Iran and complete the military service.

Based on the literature and context reviewed earlier, we set out to explore this research question:

RQ. What are the motivational trajectories that emerge out of the language learning histories of six Iranian males pursuing graduate degrees at a major university in the United States?

METHOD

Research Design

As the purpose of our study was exploratory, we adopted a design that could be described as retrospective longitudinal. The general goal of this design is to obtain a developmental profile, in line with our CDST framing, of how learners' L2 motivation changes throughout their development. Rather than taking a longitudinal approach that spans years of data collection, we employed a retrospective interview procedure (Côté, Ericsson, & Law, 2005) to elicit quasi-narrative accounts of key phases of the learners' language-learning histories, beginning with their first L2-learning experiences and leading up to their current period of life in this domain. Inviting participants to "retrospect" on their language learning was ultimately suited to examining and representing the present in a situated and dynamic way as a continuation of the past. The accompanying interview procedure elicited temporal reference points (i.e., time windows) that relate specifically to the respondent's language-learning histories and probes to aid them in verbally reconstructing specific events. The purpose of this design is to gather longitudinally thematic indices of participants' L2 motivation in association with the types and amount of activities that participants engaged in throughout their ongoing L2 learning. This approach to data elicitation is premised on the assumption that the recall of past episodic experiences is a deliberate—though, as we explain later, also imperfect—process that can serve various social, directive, or self-constitutive functions in learning and development through means of autobiographical reasoning (Bluck & Alea, 2011; Côté et al., 2005).

Participants

Six participants were recruited in a criterion sample from a social media site belonging to an association for Iranian graduate students at a large research-intensive university in the Midwest

United States. These individuals had experienced both somewhat typical and somewhat unique language learning experiences, and we were curious how these had contributed to their phenomenological L2 motivational patterns over time. In this study, we report only on their language-learning history and experience prior to their arrival in the United States. Details of participants' ages, length of L2 study, language exam scores, and length of residence in the United States are presented in Table 1. Pseudonyms are used throughout to maintain anonymity, and we present a brief snapshot of each participant's academic profile.

At the time of data collection, Ebi (32) was a second-year doctoral student. He was born in a city in southwestern Iran. He lived in the same city up until he was 18, when he was admitted for his bachelor's degree in mechanical engineering at a major university in Tehran. He completed his master's degree at another university in the same city. After his first graduate degree, he was employed by a company in which he worked alongside some European coworkers for 2 years. He then applied and gained admission to an American university.

Cyrus (26) was a second-year doctoral student. He was born in a port city on the southern coast of Iran and lived there until he was admitted to a major university in Mashhad (a major city close to the northeastern border of Iran) to do his bachelor's degree in mechanical engineering. He did his master's degree in the same field at another prestigious university in Tehran immediately after completing his bachelor's degree. After graduation, he relocated to do his PhD in the United States.

Arman (23) was a second-year doctoral student. He was born in a large city in southwestern Iran and lived there until his entrance to a top university in Tehran at age 18. Having completed his bachelor's degree in mechanical engineering at that university, he was directly admitted to a PhD program in the same field in the United States (without doing a master's degree).

Keivan (28) was a third-year doctoral student. He was born in Tehran and lived there until his entrance into the United States at the age of 26. He completed his bachelor's and master's degrees, both in mathematics, at two top universities in Tehran and came to the United States to complete a PhD.

Alireza (28) was a third-year doctoral student. He was born and lived in Tehran until his entry into the United States at the age of 26. He received his bachelor's and master's degrees in computer engineering from two top universities in Tehran

TABLE 1
 Details of Participants' Backgrounds Prior to the First Interview

Participant	Age	Years of English Study	Years of Private English Classes	TOEFL iBT Score	Years of Residence in the United States
Ebi	32	7	2	103	2
Cyrus	26	7	2.5	96	1
Arman	23	7	6	92	1
Keivan	28	7	3	101	3
Alireza	28	6	3	91	2
Hamid	29	7	2	90	1

Note. TOEFL iBT = Internet-based Test of English as a Foreign Language.

and moved to the United States to do his PhD in the same field of study.

Finally, Hamid (29) was a first-year doctoral student. He was born and raised in Tehran and lived there until his entrance to the United States. He completed both his bachelor's and master's degrees in mechanical engineering at a top university in Tehran. He applied to study abroad two times: First he applied to French universities immediately after college but his applications were rejected; he also applied after his master's degree and gained admission to the American university at which he was studying at the time of data collection.

Data Collection Procedures

In choosing the retrospective interview data elicitation technique, we considered not only what we researchers wanted to know, but also what the respondents would be able to recount accurately from their language-learning histories. Two sets of questions were developed (see Appendix B) and piloted with other graduate students not among the six participants of the current study. Instruments were then modified based on the feedback received from these individuals. Mutually convenient meeting times and locations were scheduled with the six participants to conduct the interviews. Interviews took a "grand tour" approach by beginning with a very general opening question that "provide[d] a natural springboard for further questions" (Richards, 2003, p. 56). All participants were interviewed twice over the course of one semester; these interviews were conducted in Persian, the respondents' shared first language. Interviews lasted over 60 minutes on average (i.e., they ranged from 30 to 109 minutes) and were audio-recorded and transcribed with the written consent of our participants.

Data Analysis

Data were translated into English by the first author, and coded in NVivo (QSR International, 2015) following an analytic inductive approach (Saldaña, 2015) to identify the main events within time windows and other bottom-up conceptual categories from the data. These data were then examined explicitly with reference to the three overarching motivational principles of value, truth, and control. Here we used process tracing (Bennett & Checkel, 2015), a CDST-compatible analytical technique, to outline the dynamic processes that led complex pathways of development to culminate in particular outcomes. Taking the language learners' motivational development as the complex adaptive system (hereafter *system*) under investigation, the purpose of this process tracing analytic strategy was to examine how L2 motivation trajectories and patterns emerged from the dynamic and adaptive interactions of this system with environmental conditions. By reporting on our dataset using the distinct time windows our participants chose to structure their language-learning histories, we have taken a chronological approach in the presentation of our results that follows. We do this to reflect our aim of capturing changes in motivational trajectory (see Figure 1 and Table 2) that arise from adaptive interactions between learner internal and contextual factors and the resulting patterns of emergent stability at different stages of individuals' learning.

RESULTS AND DISCUSSION

Middle School: Initial Encounters With L2 Learning

All participants' initial encounters with the L2 correspond with a roughly identical scenario—these characteristics represent the initial conditions for this time window. All individuals began

FIGURE 1
Global Model of the Motivational Mechanisms Regulating Learner Behavior

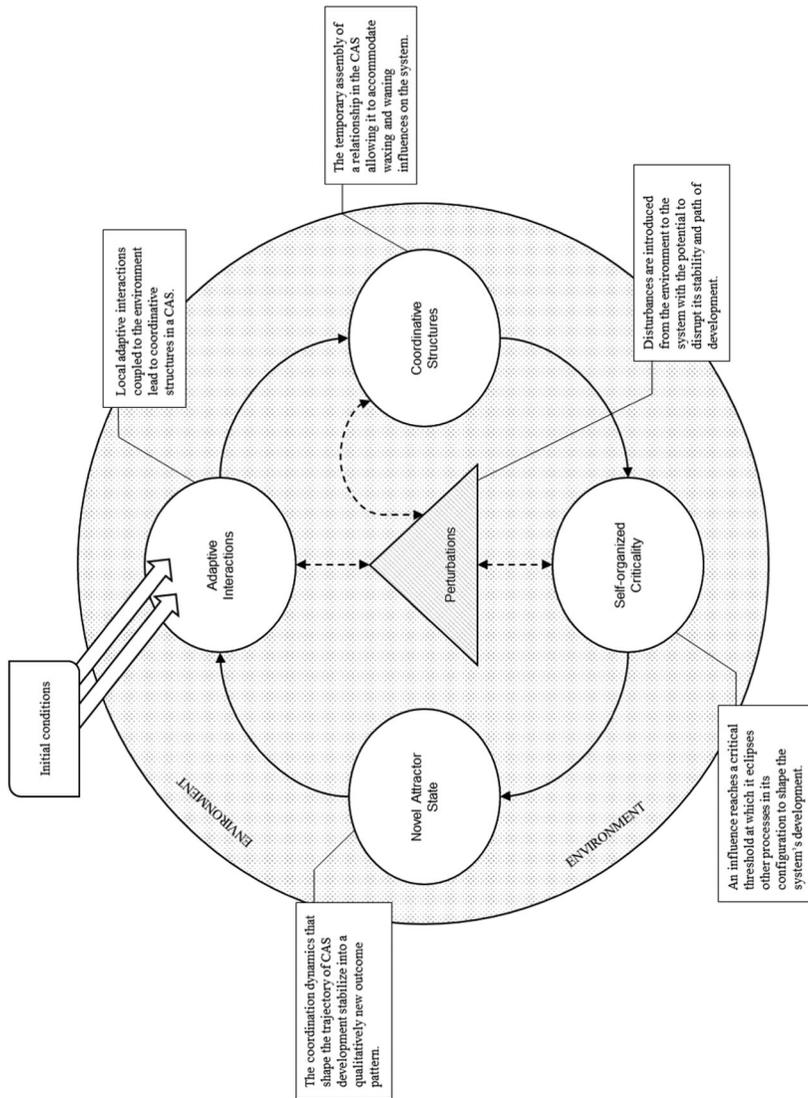


TABLE 2
Key to Terms in the Global Model of Motivational Mechanisms (Figure 1)

Term	Example Manifestations in the Data
Initial conditions	Learners' (six male, Farsi L1 speaking, Iranian nationals) initial encounters with L2 learning began as 2–3 hours of formal (i.e., classroom) English language instruction in the 2nd year of middle school at age 13.
Adaptive interactions	In graduate school, learners realized the central position of English learning in their life goals (value), perceived this learning pursuit as something that is both within their means (control) and realistic (truth-value), and gauged their progress toward that goal to be in the right direction (truth-control).
Coordinative structure	In middle school, parents decided for learners to attend private or public-sector L2 classes. The learners trusted their parents and experienced this as a self-determined choice, enabling the learners to accommodate this potentially negative influence (lack of control) as a positive one (increased value) under these conditions.
Perturbation	The high-stakes Konkoor exam was introduced during secondary school. This acted as a disturbing force with the potential to shift all learners out of stability and into a different direction of language development and action.
Self-organized criticality	The influence of teachers reached a critical threshold during secondary school and became so prominent in shaping learners' pathways of development that new patterns of behavior emerged for all learners.
Attractor state	An outcome pattern the learners stabilized in during graduate school was the qualitatively new state characterized by the extreme value associated with living and studying abroad (primarily in North American universities). In the Iranian context, this value for the L2 and for studying abroad can be seen as a desire for learners to regain freedom and control over their lives.

learning the L2 in the second year of middle school at age 13; this took the form of 2–3 hours of L2 instruction per week. During this time window, the dominant influence on participants' experience of language learning seems to have originated from the important people in their lives, such as family members and friends, in addition to course-related factors including teaching materials and their teachers.

Based on the participants' descriptions of their initial encounters with L2 English, their interest in L2 learning was instigated by their family members as was their decision to enroll in L2 classes. Not surprisingly, in the case of the latter, their parents actually seem to have made the decision for them to attend private- or public-sector L2 classes. In these individual–environment interactions, there is a relatively unique local adaptation that occurs as children in these cases, Higgins (2014) argued, experience this choice as self-determined and as “our choice” rather than “their choice.” This illustrates the temporary assembly of a coordinative structure that enabled the learners to accommodate a duality of influences—that is, influences that could be positive or negative under different conditions. One might

assume if the students had no role in the selection phase as their parents made the decision for them, they may not logically see this choice as self-determined (no control) and this should deteriorate their intrinsic motivation for L2 learning—an assumption that has some theoretical and empirical support from a self-determination theory perspective (e.g., Noels, 2001). However, given their lack of independent decision-making capacity, these young L2 learners' put their trust in the decisions that their families made for them and accepted those decisions as their own (for one review, see Costanzo & Dix, 1983). The desire to meet their parents' expectations has elsewhere been reflected in motivational concepts including the ought-to L2 selves (Papi et al., 2019; Dörnyei, 2009b), family influence, parental encouragement, and extrinsic reasons for language learning (Noels, 2003), which are usually shown to be weaker types of motives mostly among adult L2 learners (see Al-Hoorie, 2018; cf. Papi et al., 2019).

In other words, children give up their own choices to their parents (control) since they trust their parents to act as proxies who know what the right decision is (truth-control) and whether

that really will benefit them (truth-value). Thus, in this time window, the initiation of one's language learning pathway and any associated goal-directed pursuit is the result of an adaptive interaction of value, truth, and control—although children exert their sense of control effectiveness through their trusted proxies (in this case, their parents).

Once such temporary configurations have served their purpose at the onset of behavior, continued adaptation renders them obsolete. While the early choice to initiate L2 learning was made by participants' parents, learner–environment interactions continued and provided individuals with the flexibility required to adapt to the dynamics of the new environment. Corresponding evidence for this was visible in the data as participants' motivation for L2 learning became influenced primarily by their positive learning experiences in their classes. These positive learning experiences were shaped by immediate course-related factors including their teachers, teaching materials, and classroom activities and seem to have resulted in interest in L2 learning or notions that some conceptualize under the rubric of intrinsic motivation (Noels, 2001) and others as attitudes toward L2 learning (Dörnyei, 2005). Such adaptations shed light on the ways that motivational influences on the learners wax and wane with time, as a function of the system recruiting only the most salient motivational factors to its temporary adaptive configuration. During this early period of L2 learning, students all attended two classes, with the second constituting only a small portion of their overall English grade, and used two different textbooks, one for the required course and one for an optional complementary course. All participants reported remembering their teachers and the textbooks they used for their complementary classes.

EXCERPT 1

We used a textbook named *English Today* which had colorful pictures and came with audiotapes. We also listened to some English songs like *Old McDonald Had a Farm*. They took us to an English lab once in a while to show us some films on which we practiced our English. They didn't work enough on our speaking though. (Keivan)

The entertaining nature of the complementary classes and the lack of a sense of obligation to do well in these courses resulted in students' sense of control over managing their learning pursuits. Such a sense of control is usually gen-

erated through learners' perceived success and competence in performing different activities as well as how autonomously they are able to pursue this process (e.g., Joe, Hiver, & Al-Hoorie, 2017). Positive classroom feedback that indicates how successfully students have managed different aspects of language learning, and other supportive teacher behaviors plays a critical role in this. Thus, adaptation of learners to environment came about as the influence of significant others from students' initial L2 learning began to wane and be taken over by such course-related situational and experiential factors including teacher's practice, which has been observed to be directly related to student engagement (e.g., Guilleaume & Dörnyei, 2008; Papi & Abdollahzadeh, 2012).

The required L2 course that all learners enrolled in, by contrast, was highly structured. The syllabus was based on prescriptive teaching of L2 grammar and vocabulary lists, the teaching style was highly didactic, and the course ended with a final summative exam. This course did not generate the same sense of autonomy and interest as the complementary course although it was higher on the value dimension (i.e., grade). Thus, from the view of a complex adaptive system, too rigid a structure, such as the teacher's controlling style that Keivan reported on (see Excerpt 2), produces a nonoptimal set of learner–environment interactions that enable the desire to follow but not the freedom to enjoy those behaviors. This is a finding that has empirical support both in and outside the field (e.g., Noels, 2001; Reeve et al., 2014).

EXCERPT 2

We did dictations, filled in blanks and had to write textbook exercises in our notebooks. I didn't like these activities at all. They mostly worked on reading and sometimes writing. I never liked grammar. I didn't understand grammar, past participle something; I don't know. (Keivan)

At the same time, due to ongoing learner–environment adaptations during this period, the influence of teachers became so prominent that the system reached a critical threshold, where new patterns of behavior emerged. In complexity terms, this is known as self-organized criticality. It was here that teachers emerged as one of the more powerful influences on participants' motivation either positively or negatively, particularly by providing feedback on students' performance. From this point on, the value of this single parameter (i.e., the importance of the L2 teacher)

played a key role in shaping the path of learners' motivation as it developed.

EXCERPT 3

My teacher cared about me a lot. She paid attention to my mistakes and encouraged me. This influenced me positively. (Alireza)

To illustrate this shift in learner adaptation due to the coordinative structure and newly reached critical influence of teachers, let us consider Alireza's data further. During his first-semester class, Alireza was ranked as the top student and was even granted a tuition waiver. In the second semester, however, things changed dramatically. He was put into a very crowded class in which students could no longer sit in groups and collaborate in classroom activities. He did not like the teacher especially because this teacher had strict rules, put pressure on the students, and did not pay attention to him, a perfect example of the controlling teaching style that can be detrimental to intrinsic motivation (e.g., Noels, 2001; Reeve et al., 2014). As the data illustrate, the result of this learner and environment interaction was a period of self-organized criticality in which the influence of teachers played a temporarily dominant role in shaping the pathway of development. This was manifested in a negative way in Alireza's L2 motivation in relation to the required class.

EXCERPT 4

The teacher was so strict and serious about his standards; we had to have our dictionaries on us. I sat at the back of class. In some sessions I didn't even speak a word. It felt so bad. I don't remember what activities we did. I think I skipped some classes too. I failed the course that semester and stopped going to English classes. I lost my interest in English. You know when you are going to a class just because you want to but somebody puts pressure on you for doing things, it gets really difficult. (Alireza)

Following this negative experience, Alireza abruptly stopped attending L2 classes until his master's exam about 9 years later. He believes he would have continued his class if he had liked his teacher. The perception of lack of control over his learning experience made Alireza lose motivation despite the fact that almost the same values as the previous course were associated with the new course. He still could have used high performance in English to meet learning expectations and gain the approval of his parents to become value-effective, which was something quite likely (truth) given his previous successful experience, but he did not because he did not enjoy or feel

autonomous in his classes (control). This type of coordinative structure shows that learner adaptations to the context may run against some intuitive concepts, in this case, the theory of expectancy-value whose premise is that when both the value and the likelihood of success are high, the motivation for pursuing the goal is high (e.g., Papi et al., 2020). In Alireza's case, the value and expectancy (truth) of success were high but the lack of the control dimension of motivation trumped both the value and truth motives.

As this time window illustrates, these learners initially had no self-determined long-term goals (value) for learning English and were not aware of its relevance to their future lives. The only values that motivated them to abide by their parents' decision for them to attend these classes were to gain their parents' and teachers' approval or to avoid their disapproval. For these learners, the "growth spurts" in their initial motivation for English learning were highly dependent on their desire to be good at learning the language (control) based on the feedback they received from their teachers and parents on how well they were managing their learning process. The learner–environment adaptation to course-related themes, such as learning activities and materials, teachers, parents, and grades provides support for the strength of this argument.

Secondary School: Intermediate Events

Transitioning to the next time window (i.e., secondary school), many of the characteristics of L2 classrooms and factors related to general education objectives and procedures were similar to those in participants' previous encounters with L2 learning. From continuing learner–environment interactions, the data showed some coherence begin to emerge in individuals' L2 motivation pathways as the learners used constraints from context and the L2 learning experience to develop more adaptively. Language classes during this period first differed very little from the earlier required middle school classes. In fact, the lack of long-term and L2-specific goals were evidence for the argument that almost no values other than meeting the requirements of the course were associated with L2 learning in secondary school. However, the data also show that this time window did not simply feature more of the same, and the learners had to actively deal with perturbations, the most prominent of which took the form of the college entrance exam. Perturbations can be seen as a disturbing force introduced to the system with the potential to jolt the learner out of stability and

into a different direction (Hiver, 2015; Hiver & Al-Hoorie, 2020). In seeking to adapt to such perturbations, the learners began to anticipate the consequences of various choices of thought and action. Anticipation is an adaptive dynamic that occurs when learners make conditional changes on the basis of signals (e.g., perturbations) generated from the outside environment.

In this period of L2 learning, the major perturbation was the high-stakes college entrance exam, known as the Konkoor and described by some as “the SAT on steroids” (Jew, 2012), which functioned as a newly introduced aspect of system development that overshadowed many other factors and influenced students’ L2 motivation and learning. Performance on the English section of the Konkoor, in general, was not seen as an important factor in the students’ success on the exam given the low weighting assigned to it in the evaluation rubrics of this exam. This meant that studying English may have been perceived as an inefficient use of time that could have otherwise been used for studying more important subjects. The relatively lower value of English in the high-stakes Konkoor acted as a major perturbation shifting the learners out of the pathway of other, alternative motivational influences. The attitude toward studying English was transparent in both the teachers’ and students’ orientation toward the subject.

EXCERPT 5

The classes in secondary school were really ridiculous. We had to memorize and recite the readings. In the first year our teacher was a big, fat crocodile who punished us physically. In the second and third years we had another teacher who always talked about politics. In the fourth year we had a much better textbook and a good teacher but we didn’t pay enough attention to English since other courses were more important than English in the Konkoor. (Alireza)

The data show that the case of this exam is a good example of interaction among control, truth, and value dimensions, with value having the dominant role. The value of the Konkoor is a shared reality in Iran and has been established as a norm (value–truth). Because investing in English learning might have been a costly choice, resulting in possible failure in the Konkoor (negative value), the students decided to spend their time on other subjects in order to be successful on the exam. This was despite a handful of participants having reported positive learning experiences (control) in their last year of secondary school and receiving good grades in their English classes

(truth–control). Therefore, the truth–value relation here functions to create commitment to pursue the goal of success on this exam. The objective of getting into college (value) seems to have been a superordinate motivation in contrast with the desire to succeed in increasing English competence (control). However, creating commitment through setting the right goal (truth–value) by itself does not guarantee motivation for every learning choice. Learners would first want to know if their efforts are actually directed toward their desired goals (control–value). They would then need to know if they are taking the right step toward the right goals (i.e., truth–control–value). Learning English in secondary school would not really have been the right step (truth–control) toward achieving the specific goal of success on the exam (truth–value). This directed the students toward a different choice, which was engaging their time and attention in other courses that were given more weight in the college entrance exam instead of the lightweight English. In this way, the perturbation experienced by the learners in the form of the Konkoor shifted the system out of the pathway of other motivational influences and resulted in the adaptive dynamics described previously as the individuals made conditional changes to their L2 motivational repertoire.

College: The Stakes Change

From the onset of this time window (i.e., college), new local interactions between the learners and the environment to which they were coupled began to take shape. These featured differing purposes, directions, intensities, utility, and varying rewards and costs accruing from them. For instance, learners’ projected goals of what they wanted to achieve and who they wanted to be in the future emerged here as one prominent learner–environment interaction. L2 learning was not generally a major part of these goals, but can be seen partly as a means to pursuing them (value). At this stage, family- and course-related factors also began to lose influence on the participants’ motivation for L2 learning, whereas classmates and peers emerged as important influencers of individual L2 learning choices. Common practices during this time window included engaging in different English learning activities such as watching American movies and TV shows, listening to English music, accessing English media via the Internet, and casually attending English classes.

These new coordinative structures that result from continuing local interactions can be

illustrated through Alireza's experience. Alireza's motivational trajectory coming into this time window deviated very little from the earlier influences and adaptations incorporated in the system. Assuming that his competence in English was adequate to pass the two required courses in college, he still chose not to attend any English classes even after entering university. However, the vibe of the new academic context, which associated high value to learning English, motivated him to engage in many autonomous learning activities with other students. English seemed to become part of his personal future self, a picture of someone who was knowledgeable about the outside world and had a good command of English, a notion that has been described by some researchers as an ideal L2 self (Dörnyei, 2009b) or identified regulation, which is the most self-determined form of external regulation within self-determination theory (Noels et al., 2000).

EXCERPT 6

I really felt the need for English and wanted to improve it since the people around me were good in this language. We watched movies, used the Internet to get the lyrics of the songs, engaged in e-chatting in English chat rooms and in email correspondence, checked on the Yahoo news, read *English for Your Trip* textbooks, and wrote new words in a notebook. We also tried to learn new vocabulary and read the English versions of our technical textbooks together, though inconsistently. (Alireza)

Engagement with various English learning activities and cultural products might have also improved these learners' attitudes toward the English language and English-speaking communities, and contributed to their later decision to study in an English-speaking country. In a study in the context of Iran, Papi and Teimouri (2012) found that secondary school students had significantly more positive attitudes to English learning and the cultures and communities associated with the language. In addition, the secondary school students had significantly stronger ideal L2 self, which is transparent in our participants' desire to study abroad in an international context. In Alireza's case, this happened earlier than other students and in the final year of his undergraduate program.

EXCERPT 7

Towards the end of my bachelor's program, I was thinking of studying abroad because some of my friends went to the United States to study. It was not because there was something missing in Iran. It was

because my friends did it. This could guarantee your job prospects. (Alireza)

Ultimately, this participant did not apply to study abroad at that time but these new coordinative structures described previously acted as a course correction of sorts and persuaded him to resume his L2 classes after 9 years of no language study and 2 years into his master's program, which he described as a life-changing period. This pathway correction the learner embarked on reflects the growing recognition of Alireza for the value of English in his master's entrance exam and its potential in his future. These two goals constituted the main values of learning English for him, which were also shared as reality by his peers (value-truth). Due to the newly assembled coordinative structures in this period, he also was largely influenced by his peers' L2 learning activities and wanted to be as good as his peers in this subject (control). Thus, the rising influence from the value and control dimensions resulted in a motivational path correction of sorts and led this participant to make the choice of resuming L2 learning after so many years.

The language-learning histories of these participants were not limited to L2 English. During his college years, Hamid became highly interested in the French culture and language through the goal of studying and living in France. He also perceived himself being able to learn the language (control) and enter a French university (value) in addition to other benefits such as working and living in France (value). This is once again evidence of a learner-environment interaction enabling their motivational development to accommodate new, rising influences. For Hamid, learning French was initially high on the truth dimension (i.e., knowing more about the French culture and language), reminiscent of Clément and Kruidenier's (1985) notion of knowledge orientation, social-cultural or intellectual orientation (i.e., knowledge for knowledge's sake) to L2 learning as well as Gardner and Lambert's (1972) notion of positive attitudes toward the target language community and culture.

EXCERPT 8

I wanted to go to France because I thought their literature and culture was rich with a huge intellectual history. Their literary works, poetry, songs, contemporary philosophers of the time, and street protests all interested me. (Hamid)

However, after his applications to the French universities were rejected, he thus reversed his decision and resumed studying English. He also

did not see French as a major part of his professional self any longer:

EXCERPT 9

I stopped going to my French class because I didn't have any more time and money for it. I didn't find it professionally useful either. I had to work, apply and take the TOEFL. I couldn't invest my resources in it. (Hamid)

In other words, the rising influence resulting from this development led to an abrupt path correction. Learning French meant investing personal resources in something that not only did not increase his chances of further academic advancement, but also lowered his chances by consuming the time that would be otherwise used for that purpose. Compared to learning French, he reported that the time could be better used to study English and prepare for the TOEFL or the more important goal of success on the PhD entrance exam (value). In spite of Hamid's intrinsic motivation for learning French (control) and learning about the French culture and history (truth), the cost (negative value) associated with studying French outweighed his desires for control and truth effectiveness. In this way, the continued local dynamics did not reach a threshold of self-organized criticality and the influence of this new adaptation (motivation to learn French) waned, causing the learner to course correct once more. In this sense, the temporary assembly of this coordinative structure (the value dimension) had served its purpose and, as with other participants, continued adaptations (with truth dimensions in this case) resulted in another path correction. Hamid thus reversed his decision and resumed studying English.

During this period of study at college, the benefits of L2 learning (value) became shared reality (truth–value) among the students, although they still did not know how exactly L2 (English or French) would be the right step toward achieving their future goals (truth–control). These local adaptations once again led to new coordinative structures that enabled the learner to respond flexibly to the dynamic environment and engage in path corrections (i.e., to reengage with L2 study) throughout this time window. Several students (Arman and Hamid) even took a further step and applied to several universities abroad. The perceived role of the L2 in their futures (value) as a shared reality among the students (truth–value), and their perceived competence for (control) and accompanying likelihood of (truth–control) being admitted into a univer-

sity program abroad constituted an unfamiliar yet interrelated motivational configuration that resulted in new learning choices (e.g., studying English or French, applying to study at universities abroad).

Graduate School: Expanding Horizons

Looking back, from the previous time window, Arman seemed to be the only participant who was very enthusiastic about the target culture and the idea of one day studying abroad. This interest dated back to early experiences and the influence of family and friends. When Arman enrolled in university, the new environment led to adaptive interactions of different motives and conditions that made it possible for him to consider applying to North American universities more seriously. This reached a critical threshold as he came to realize the central position of English learning in his academic and nonacademic goals including getting a PhD from a U.S. university (value), and living in the United States to learn about the American culture and society (truth). He also considered the goal to be within his means (control) and realistic (truth–value) and his progress toward that goal to be in the right direction (truth–control). This coordinative structure thus resulted in the idea of gaining admission into a PhD program at a North American university reaching a very early self-organized criticality, and in the final time window, the coordination dynamics shaping the trajectory of the learner's development stabilized into a qualitatively new outcome pattern characterized by motivated learning choices that would help him succeed in what he wanted to achieve.

While Arman was ahead of this game in this regard, in this final time window represented in our data, values underwent transformation for all the participants; course-related factors and family lost almost all influence and instead personal and professional goals emerged. These newly salient goals were related to participants' attitudes toward English-speaking (mainly North American) communities and cultures growing sharply more positive and eventually reaching a critical threshold at which the desire to study abroad eclipsed all other processes in its configuration to shape the learners' development. This desire, which resembles Gardner and Lambert's (1972) notion of integrativeness and Dörnyei's (2009b) ideal L2 self, rapidly stabilized the learner into a novel pattern as this notion became part of individuals' personal lives and a possible part of their professional future domestically and beyond.

EXCERPT 10

The new university was quite different. Everybody had a good command of English. Everybody was applying to study abroad. There I found out that English could make a difference. (Cyrus)

Studying abroad is a common and highly valued goal among academically strong graduate students of top universities in Iran. On one level, the fact that this qualitatively new pattern of stability emerged for the learners is unsurprising: studying abroad is valued because it is associated with desirable life opportunities. With a PhD from a top international university, learners might be able to get a good job in an Iranian, North American, or international institution with a desirable and stable income. On the other hand, failure to be admitted to a PhD program either in Iran or overseas would leave them with no option but being drafted into 2 years of low-paying obligatory military service, during which their academic dreams and competence might undergo notable dissipation. While these academic and professional goals were frequently mentioned by the participants, their desire to study abroad seemed to go beyond these goals. Their motivation for L2 learning, their desire to enroll in a graduate program, and finally finding a job in a Western country all seem to be embedded within their broader motivation for a better life with more freedom, security, and growth.

EXCERPT 11

There were two typical reasons for applying. One was about scientific interest; the other was about the bad situation in Iran. Some people feel the bad situation but maybe they don't consider it so serious to leave the country. They don't see it's worth the trouble. For me, both of them were the case, but the second one was more important than the first one. I did not come over only for the scientific reasons. I wanted to experience a new life. I wanted to see what's going on in the world. (Cyrus)

Thus, the phase transition which took hold in the trajectory of the learners appears to have come about in this way: The influence of this desire to study abroad was intensified by nonacademic motives such as the desire to experience living a better life abroad. Once this value-related motive took over all other processes in the learners' motivational configuration and reached a critical threshold for them, they settled into a new stability that was governed almost entirely by their perceived values associated with studying abroad.

EXCERPT 12

The situation in Iran was not good. I had financial problems and wanted to be independent. I thought doing a PhD in Iran would be a bad decision because the system was corrupt. You must have connections to find a job. The society was becoming corrupt too. Everyone was mean to each other. The universities did not give enough monetary support to students. It was mafia in the employment system. There was no place for me. (Keivan)

The qualitatively new outcome pattern that emerged was that participants had now developed stable ambitions of living a life of prosperity with fewer or none of the social restrictions imposed by the conservative political system in their home country. These included restrictions on dress, social and personal relationships, and unfiltered access to global media. Arman, for instance, mentioned the lack of freedom for women to dress themselves the way they wanted; and this desire to experience what participants perceived to be a new and free life was salient in the data. According to the tenets of reactance theory (Brehm, 1966), the motivation to restore freedom that has been eliminated can result in value creation—that is, increasing the perceived value of something. This may illustrate an attractor state that is familiar and relatively stable in this L2 learning context: The desire to recover control over their lives has been referenced as the reason why many Iranian graduate students leave the country. Valuing and even exaggerating the value of living abroad and studying at a North American university seems to be how these students reacted to the elimination (or the threat of elimination) of the freedoms and securities that they desired. It also is the main characteristic of the qualitatively new outcome pattern the learners stabilized in.

EXCERPT 13

I thought in the US and in the European countries people have freedom and welfare and are scientifically advanced. I thought hard work would pay off in the western countries. You could move up the ladder of success. (Alireza)

Thus, looking at this time window in our data, it was apparent that the value of a single parameter, the desire to study abroad, had reached a critical threshold and taken over the coordination of all the motivational systems. This new value, which was a shared reality among the students (truth-value), along with participants' reasonable expectations of managing to gain admission from North American universities (truth-control), created an attractor state characterized by the

students' strong motivation for doing anything necessary to improve their English. By the close of this time window, all the learners' pathways of L2 motivational development had undergone qualitative changes into a new stability and the resulting phase transition had settled into a curious L2 motivational state that was manifested in participants making the determination to take action and succeed in getting admission from a North American university to be able to live and study in an international context—value-related motives commonly subsumed in the field under an ideal L2 self (Dörnyei, 2009b; Papi et al., 2019).

GENERAL DISCUSSION

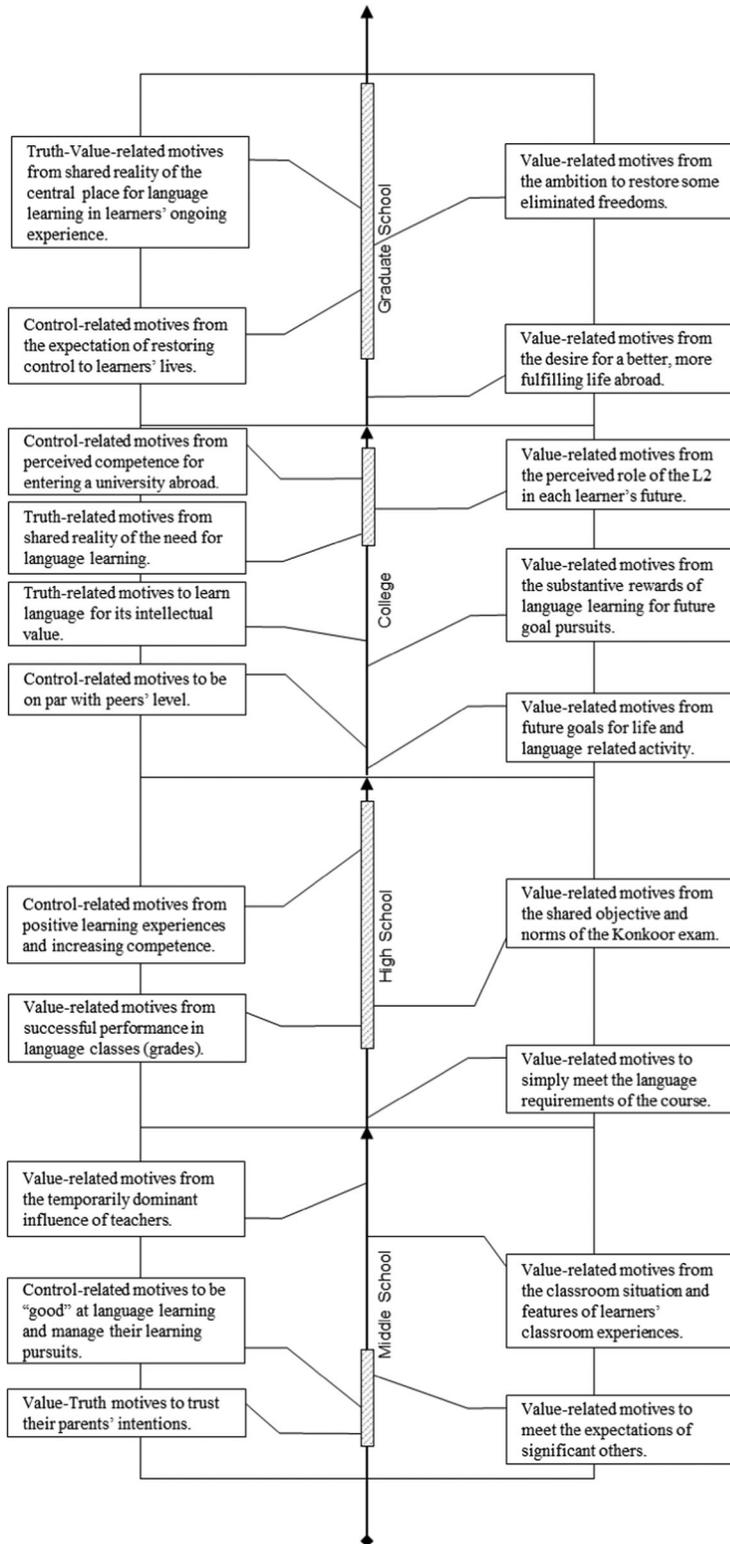
Using process tracing, in this study, we set out to construct a developmental blueprint of how learners' L2 motivation adapts and changes over the years of their L2 learning experience (see Figure 1 and Table 2). Applying Higgins's (2014) global framework of motivation, we examined how changes in L2 motivational trajectories arise from adaptive interactions between system components (value, truth, and control) and environmental conditions (i.e., learning contexts), capturing the emerging patterns of variation and stability at different stages of individuals' L2 learning. A visual summary of these results is presented in Figure 2.

As shown in Figure 2, the initial conditions that the students experienced set the stage for the following adaptive interactions between the three dimensions. Our results indicate that the initial motivation for the participants as middle school learners originated from their value-related motive to meet the expectations of their parents, a notion referred to elsewhere under the rubric of the ought-to L2 self (Dörnyei, 2005, 2009b) or introjected regulation (Noels, 2001). The students accepted their parents' decision for them as their own and attended public or private L2 classes. This finding runs counter to the common assumption in L2 motivation research that more self-determined (Noels, 2001, 2003) or internalized learning goals (e.g., ideal L2 self or integrated regulation) are generally the main sources of motivation for learning a language (see Al-Hoorie, 2018; Hiver & Al-Hoorie, 2019). These findings also confirm the results of prior research by Papi and Teimouri (2012), who found that family influence, framed also from the ought-to-selves construct, was stronger for middle school and secondary school students' than for university students.

The study revealed interesting adaptive interactions between the value, truth, control and environmental factors as the learners drew on coordinative structures at different stages of the L2 development process. These enabled the learners to accommodate greater developmental variability, which was illustrated by interactions exerting a more prominent impact on them at times and waning at others. Whereas the initial engagement in the L2 learning process was influenced by learners' value-related desire to meet the expectations of other significant individuals, the motivation to maintain engagement in the learning process was more a function of their control-related motives including their learning experience and interest in situational factors such as the learning materials and activities and more importantly their teachers (e.g., Hiver et al., 2019). When such influences on the learners reached a critical threshold, the resulting motivational coordination led to a single parameter (e.g., teachers) shaping the learners' paths of development as they progressed. These results point to the significance of the classroom environment and the teacher as the creator of the learning environment. They also confirm the findings of previous studies in which intrinsic motivation (Noels, 2001; Noels et al., 2000) and L2 learning experience (e.g., Kormos & Csizér, 2008; Papi, 2010; Papi & Teimouri, 2012, 2014) have emerged as the most significant predictors of motivation, especially among middle school and upper secondary school students.

At times, disturbing forces (i.e., perturbations) nudged the learners out of stability and redirected them down a different course. In secondary school, for instance, learning L2 (i.e., English) communicative skills at private language schools lost its significance due to the fact that such skills were not the subject of the national college entrance exam. That is, even though learning in private school involves many control-related motives such as the enjoyment of communicative activities, the lower value associated with learning communicative skills and the higher value associated with test-preparation classes override the motivation from such control-related motives. In other words, intrinsic motivation and positive L2 learning experiences are not necessarily the strongest of motives for persistence in L2 learning in every situation and the strength of each motive is more a function of its interaction with the environment as well as with the other motives than inherent in the motive itself. In this case, the high intrinsic value of English learning was easily dwarfed by the low instrumental value of the

FIGURE 2
Line Graph of Factors Influencing Learners' Motivational Trajectory for Language Learning



Note. Shaded boxes indicate period of intense adaptive interactions among control, value, and truth.

language and the high instrumental value of other subjects.

In college, the L2 learning landscape is very different. L2 English has become part of the students' life and enjoys many instrumental and even long-term values (Papi & Teimouri, 2012). Patterns of stability emerged as the learners regained temporal coherence in a motivational path correction of sorts. Students watch English movies and TV shows; listen to music in English, and access English language information on the Internet. Many students also think about studying abroad in English-speaking countries. The new environment makes English a source of motivation from value-effectiveness, which radically shapes the students' engagement in English-learning activities and re-enrollment in private English classes, which in turn become the source of control-related motives that work in harmony with the value-related motives and the truth-related positive attitudes of these students to result in optimal motivation and engagement in L2 learning. Some positive language-learning experiences with French were also reported in this period; but these control-related motives were soon overshadowed by the students' stronger value-related motives for success in learning English and gaining admission to a North American university. In other words, the coordination dynamics apparent in our data emerged at different points and led to qualitatively new stabilities in L2 learner's motivated engagement with the L2 learning process (i.e., novel L2 motivation attractor states).

CONCLUSION

Dörnyei and Ushioda (2011) have used the metaphor of a knitted net to describe the differences between the mutual existence of various theories of L2 motivation: "If we lift it up by holding different knots, very different shapes will emerge, even though the actual net is exactly the same" (p. 9). Different researchers seem to have grabbed different knots of the same motivation net and have given it the shapes they believed to be the most accurate ones. Revisited through Higgins's (2014) motivational principles of truth, control, and truth, different L2 motivation theories can be argued to have conceptually emphasized limited representations of one or two of these motivational dimensions. Gardner's and his associates' original motivation theory (Gardner & Lambert, 1972), which focused on learners' attitudes toward and interest in the target language, culture, and community; and

Clément and Kruidenier's (1985) knowledge orientation fall under the truth dimension of motivation. Dörnyei and Otto's (1998) process-oriented model, Dörnyei's task motivation (2003) and construct of L2 learning experience (2009a), Clément and Kruidenier's (1985) linguistic self-confidence, and Noels's (e.g., 2001) application of the self-determination theory can be categorized under the control dimension of motivation. Gardner's (1985) integrative and instrumental motives, and Dörnyei's (2005, 2009b) L2 future self-guides fall under the motivational principle of value. Hundreds of studies have been conducted in different contexts around the globe using these theories and have shown the importance of all these motivational constructs (e.g., for a review see Dörnyei & Ushioda, 2011). However, the studies have ignored the fact that motives do not act individually and interact with other motives as well as with the environment in their pursuit of generating language learners' motivational trajectory. As demonstrated in this study, different motives sometimes point to different and contradictory directions and engage in competition with other motives, which in interaction with the environment in which they exist, variably form the learners' motivated behavior. Depending on the environmental conditions and the chronic motivational characteristics of the individuals, some of these motives emerge as winners while others lose in this game of drives. At other times, these motives work in harmony and all point to the same direction, which is when an optimal motivational configuration results in conducive learning behavior. These findings provided preliminary evidence that L2 motives do not always work individually; rather, it is the dynamic interplay between these motives in interaction with the contingencies and affordances of the learning environment that determine learners' motivational trajectory and show how motivations work together for language learning to happen.

The present study has been a first in the field to employ Higgins's (2014) conceptual framework as a way to integrate different motivational concepts and present a more global picture of the motivational processes in L2 learning histories. We believe this framework has broad potential to open the conversation up to wider theoretical perspectives in L2 motivation as it takes a bird's eye perspective of the phenomenon through the three axial knots of value, truth, and control to explain in a more ecologically valid way how these intersect over time to bring about changes in motivation for language learning.

Future Research Directions and Limitations

In line with the aim of exploring the applicability of Higgins's (2014) conceptual framework, we found that it lent itself well to explaining the dynamics of motivation while being parsimonious and easy to grasp. Further research adopting quantitative designs would be instrumental in providing evidence to test the premises underlying this framework with reference to language learning. It will be interesting to see how different motives related to control (e.g., self-efficacy, anxiety, self-confidence, mindsets), truth (e.g., knowledge, attitudes, and curiosity as to the target language and culture), and value (e.g., goals and self-guides) interact with each other in different motivational patterns. Alternatively, individuals' propensity for self-regulation, or their motivational personality, could vary as a function of the learners' chronic propensity toward these three motivational principles. Higgins and his colleagues have elaborated this framework and produced psychometric measures for assessing such chronic propensities, which could be adapted to the language-learning context. Higgins's (1997) regulatory focus theory focuses on two different orientations (promotion and prevention) of individuals toward the value dimension of motivation. His regulatory mode theory (Higgins, Kruglanski, & Pierro, 2003) focuses on the truth (also called the *assessment orientation*) and control (also called the *locomotion orientation*) dimensions of individuals' motivation. The very first attempts at applying them to L2 acquisition research (e.g., Papi, 2016, 2018) illustrate their potential in the field.

The findings of this study are based on participants' retrospective narratives of what happened in the past, and these are imperfect representations of the reality of language-learning encounters. Narrative psychologists agree that elicited narrative accounts are imaginative reconstructions of past events and anticipations of future ones (Panattoni & McLean, 2018). Conducting longitudinal studies that sample learners' experiences in an ongoing and iterative manner may be one way to address this shortcoming. We must also acknowledge the recent literature on unconscious motives or attitudes in L2 learning that are not captured through self-report elicitation methods (Al-Hoorie, 2016a, 2016b). Exploring this unconscious aspect through instruments that do not rely on self-report data is a promising new avenue for the field, and its applications in language learning has begun to receive wider attention (e.g., Al-Hoorie, 2020a, 2020b).

Additionally, this study was an investigation of the experiences of six male Iranian students who had come to the United States for graduate study. These experiences, therefore, cannot be generalized to other populations or more diverse contexts. More importantly, however, we have looked at commonalities across six participants. While we have found such shared experiences and characteristics in the data we elicited, the reality of a CDST perspective is also that each learner is assumed to have their own learning path and that, given these uniquenesses, individuals may not reflect all characteristics of the group and the group may not be equally representative of each individual's developmental trajectory in time and space. Given this ergodicity problem (Lowie & Verspoor, 2019), we cannot generalize from the group to all individuals and vice versa. What Higgins's (2014) model does allow us to do is trace key motivational interactions over time.

Pedagogical Implications

This study set out to examine the applicability of a new theoretical perspective toward understanding L2 motivation. Our results also point to some major instructional issues that can help teachers understand and promote learner motivation. The findings of this study highlight the critical role of parents and teachers in the early years of students' language-learning journey. Young language learners tend to have few, in any, long-term defined goals that are related to language learning or use. Nor do they seem to have an internalized image of the person they want to be in the future and how language learning would contribute to that image. Their motivation for initiating the learning process seems to be largely related to their desire to gain the approval of the important people in their lives, in this case, parents and teachers. Parents' and teachers' personal relationships with the students, therefore, seem to play a major role in the students' intentional engagement in the learning process. This issue was most transparent in Alireza's case, who quit studying English because his new teacher would not pay adequate attention to him. The findings of this study, therefore, point to the importance of parents' and teachers' active involvement in the learners' language-learning process. In the later stages of language learning, students' intrinsic motivation gains importance and they are able to invest effort and attention on their own. The participants in this study all mentioned teachers' instructional style and their own learning experiences to be determining factors in their

enjoyment of the learning process and decision to continue learning the language during their middle and upper secondary school years. Teachers' investment in improving the quality of their own instructional knowledge and practice can, therefore, enhance language learners' engagement in the classroom and contribute to their participation and persistence in the long-term pursuit of language learning. As the students enter university, it seems that teachers, parents, and even the intrinsic motivation for learning lose significance in the motivational landscape of the learners. Adult learners seem to take a more proactive role and use a variety of resources to promote their language learning with the language class being only one of these resources. Teachers, therefore, need to be aware that the learners' motivation for L2 study takes on a more complicated configuration when they are adults and their decision as to continue or stop taking L2 classes is not merely a function of what happens in the classroom context. Some of our participants discontinued learning the L2 even though they reported enjoying the learning experience and their teacher's style of teaching very much. Their decision, however, was influenced more by the broader motivational landscape that they were situated in. Therefore, while teachers would be advised to enhance the engaging aspects of their teaching to the extent possible, they might also be cautioned to not take students' decision to stop learning a language personally. At the same time, given the proactivity of motivated adult learners, it seems that providing them with various learning resources (e.g., sources of exposure to L2 input and interaction) could complement and optimize teachers' efforts to facilitate the students' learning of the new language.

Note

¹ One example of this from the business world is how interest rates or debt ratios do not budge stable financial markets until they hit a certain value, at which those rates exert a direct impact on economic outcomes.

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 APPENDIX A

 TABLE A1
 Definitions of Terms

Term	Example Manifestations in the Data
Initial conditions	The state of various complex system components, system dimensions and parameters, and environmental conditions at the point in time an observer begins observing a particular system's development.
Adaptive interactions	The coordinated, adaptive behavior of interrelated and interacting system-internal components and contextual factors that wax and wane through time.
Coordinative structure	The temporary relationship of local system components coupled to the environment that enables <i>adaptive interactions</i> .
Soft-assembled	A form of improvisational adaptation of a complex system to its immediate environment that is contextually constrained, task-specific, and takes place in real-time.
Self-organization	The internally evolving process of coordinated restructuring and formation within a complex system that results in the appearance of novel structure and functions.
Perturbation	A disturbing force introduced into the system with the potential to jolt it out of stability and redirect it toward a different pathway of development.
Self-organized criticality	The instance when a complex system reaches the point of transition between two discrete phases of stability or equilibrium, resulting in a dramatic change into a novel phase or attractor state.
Attractor state	An outcome pattern a system tends to approach and stabilize in through its self-organization.

 APPENDIX B

Interview Guide

Opening

- Confirm the value of participant's contribution
- Confirm interview length and general topic
- Offer participant reassurance on ethical issues (confidentiality, right to refuse answering and discontinuing participation)
- Confirm participant's permission to record

The initial conditions

1. I'd like you to think back to the time when you first started learning English. Please tell me how you started learning English [when/where/why did you start learning English].
2. What learning activities did you do?
3. How did you feel about your English learning/classes/teacher then?
4. Did you use English in real life? If so, in what way [watching films/listening to music/contact with speakers of English/personal needs]?
5. How important was English at that time for you?

Change in and across different phases of the process in home country

6. How was English learning during the high school/college years?
7. How important was English at that time for you?

8. Did you use English in real life? If so, in what ways [watching films/listening to music/contact with speakers of English/personal needs]?
9. How did your family/friends/classmates/teachers influence your academic career in general and your English learning in particular?
10. How did you feel about Americans/international people before you came over to the United States?
11. Why did you decide to come to the United States?
12. How important was English in this pursuit?

**Is there anything else I should have asked you about? Or do you want to add anything?
Do you have any questions for me?**

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.