9 The Relationship between Language Aptitude and Language Learning Motivation: Individual Differences from a Dynamic Systems Perspective

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Chapter Overview

Language aptitude and language learning motivation have traditionally been seen as the primary individual difference (ID) variables in the study of a second/foreign language (L2), that is, the learner characteristics that have been found to exert the greatest amount of consistent influence on the SLA process. Although other ID factors such as cognitive/learning styles or learner beliefs have also received attention in the literature (see Dörnyei 2005), their impact

on SLA has been negligible compared to that of the aptitude-motivation dyad. The magnitude of the influence exerted by aptitude and motivation depends on how these constructs are assessed and what the criterion measures are, but correlations between aptitude and L2 attainment indices are often as high as 0.50 and meaningful correlations with motivation have usually been reported within the range of 0.30–0.40. However, regarding the assessment of motivation, if (a) the criterion measure is related to learner behaviours rather than holistic proficiency measures (e.g., the extent of learners' participation in a task rather than, say, TOEFL scores); (b) the motivation measure is situated (i.e., it focuses on aspects of the learners' classroom experience); and (c) the co-construction of motivation by the participants is taken into account (i.e., by pooling the motivation of both learners in a task performed by dyads), then correlations with motivational factors can exceed 0.50 and multiple correlations involving all the assessed motives together can reach 0.70 (Dörnyei 2002; Kormos and Dörnyei 2004).

A common conception of aptitude and motivation has been that the former is the most important *cognitive* variable, while motivation is the primary *affective* factor shaping second language acquisition/learning (see, e.g., Gardner and MacIntyre 1992, 1993). As a result, including both an aptitude and a motivation measure in a research paradigm has typically been seen as a fairly comprehensive characterization of the learner's contribution to the SLA process. Thus, the current task of addressing the relationship between aptitude and motivation in this chapter goes beyond merely looking at two specific ID factors – it concerns, in effect, the broader examination of how individual difference variables in general are related to each other and how they exert their cumulative impact. As we will see below, answering these questions will lead us to the re-analysis of the overall nature of learner characteristics within the learner-environment-learning complex.

In the following discussion I first provide a brief outline of the history of L2 research on aptitude and motivation, highlighting emerging problems about the traditional conceptualization of the concepts. I then present a novel approach to understanding learner characteristics which replaces the modular view of individual differences involving multiple discrete ID factors with a tripartite system of the human mind that comprises *cognition*, *affect* and *motivation* within a dynamic systems framework. I will argue that from this perspective identifying 'pure' individual difference factors has only limited value; instead, a potentially more fruitful approach is to focus on certain higher-order combinations of different attributes – or trait complexes – that act as integrated wholes. I conclude this chapter by introducing three attribute complex candidates for the new approach, *aptitude/trait complexes*, *interests* conceptualized in a broad sense and *possible selves*.

A Brief History of Language Aptitude Research

Following the success of intelligence research in educational psychology at the beginning of the twentieth century, language aptitude research was initiated in the USA in the 1920s (for a historical overview, see Spolsky 1995). The main objective of the pioneering language aptitude tests was, similar to the first intelligence test developed by Binet and Simon in France in 1905, to increase the cost-effectiveness of language education in the public school system by identifying slow L2 learners. This prognosis aspect of aptitude tests also motivated the second wave of aptitude test development 30 years later, in the 1950s and 1960s, which produced the two best-known language aptitude batteries, the *Modern Language Aptitude Test* (MLAT; Carroll and Sapon 1959), and the *Pimsleur Language Aptitude Battery* (PLAB; Pimsleur 1966). These batteries became so widespread both in research and in various educational practices that the L2 research community developed the tacit understanding that language aptitude is simply what language aptitude tests measure. From a theoretical point of view this has been somewhat problematic given that both the MLAT and the PLAB had been developed without any well-established underlying theoretical construct, largely through a trial-and-error process that involved administering a great number of different tasks to learners and selecting those that discriminated best between good language learners and their slower peers (Dörnyei 2005).

So, what exactly is 'language aptitude'? Most scholars would agree that the concept covers a range of different cognitive factors making up a composite measure that can, in turn, be referred to as the learner's overall capacity to master a foreign language. In other words, foreign language aptitude is not a unitary factor but rather a complex of 'basic abilities that are essential to facilitate foreign language learning' (Carroll and Sapon 1959: 14). In one of the best-known taxonomies, Carroll (1981: 105) proposed that the language aptitude construct comprised four constituent abilities:

1. *Phonetic coding ability*, which is considered the most important component and is defined as 'an ability to identify distinct sounds, to form associations between these sounds and symbols representing them, and to retain these associations'.
2. *Grammatical sensitivity*, which is 'the ability to recognize the grammatical functions of words (or other linguistic entities) in sentence structures'.
3. *Rote learning ability*, which is the 'ability to learn associations between sounds and meaning rapidly and efficiently, and to retain these associations'.
4. *Inductive language learning ability*, which is 'the ability to infer or induce the rules governing a set of language materials, given samples of language materials that permit such inferences'.

Carroll's (1981) taxonomy was derived from extensive *post hoc* analyses of MLAT scores and was, therefore, inevitably determined by the composition of the actual MLAT tasks – indeed, other scholars who derived their taxonomies from using other aptitude tests produced different theoretical constructs (e.g., Pimsleur 1966). As a result, even though the composite measures yielded by language aptitude batteries consistently explained a significant amount of variance in learning achievement, simply equating these composite test scores with 'language aptitude' was seen as increasingly unsatisfactory because the notion of language aptitude defined in this way was too broad an umbrella term, referring to an unspecified mixture of cognitive variables (Dörnyei 2009b). Therefore, scholars investigating specific cognitive abilities such as working memory (e.g., Miyake and Friedman 1998) or word recognition (e.g., Dufva and Voeten 1999) started to avoid using the term altogether. Indeed, the common theme in the various post-Carroll research directions has been the examination of the SLA-specific impact of specific cognitive factors and subprocesses, thus going beyond the use of the language aptitude metaphor (see Dörnyei 2005). For recent reviews of language aptitude research, see Ranta (2008) and Robinson (in press).

A Brief History of L2 Learning Motivation Research

Many overviews exist to describe the history of L2 motivation research from its genesis at the end of the 1950s in Canada by the work of Robert Gardner and Wallace Lambert (1959) to the most contemporary process-oriented or self-based approaches (see e.g., Clément and Gardner 2001; Dörnyei 2005; Dörnyei and Ushioda in press; MacIntyre 2002; MacIntyre et al. 2009; Ushioda and Dörnyei 2009). These reviews vary somewhat in their emphases, because the scope of the various approaches of understanding what motivates language learners to initiate and sustain the lengthy process of mastering an L2 encompasses a wide range of different theoretical perspectives. Gardner and his colleagues' initial stance involved a social-psychological perspective and the motivation construct they developed was centred around language attitudinal variables. The key component of Gardner's (1985) theory was the *integrative motive*, which concerns a positive interpersonal/affective disposition towards the L2 group and the desire to interact with and even become similar to valued members of that community. It implies an openness to and respect for other cultural groups and ways of life; in the extreme, it might involve complete identification with the community and possibly even withdrawal from one's original group.

In the 1990s there was a broadening of perspectives in L2 motivational research, exploring a number of different motivational dimensions originally

introduced in educational psychology (for a review, see Dörnyei 2001). This 'cross-fertilisation' led to an unprecedented boom in L2 motivation studies and a variety of new models and approaches were put forward in the literature, resulting in what Gardner and Tremblay (1994) called a 'motivational renaissance'. A common feature of these new research attempts was the move towards a more *situated approach* to the study of motivation, examining how the immediate learning context influences the learners' overall disposition and how motivation, in turn, effects concrete learning processes within a classroom context. It was argued that the classroom environment had a much stronger motivational impact than had been proposed before, highlighting the significance of motives associated with the L2 course, the L2 teacher and the learner group.

Thus, by the end of the 1990s motivation research was characterized by a colourful spectrum of diverse theoretical strands and constructs, and in the absence of a 'gravitational centre' scholars often followed a 'pick-and-mix' method in conceptualizing motivation for their particular research purposes. This eclectic background provided fertile ground for theoretical developments, giving rise to a number of salient research programmes: Kim Noels and her colleagues (e.g., Noels 2003, 2009; Noels et al. 1999, 2001) implemented Deci and Ryan's (1985) well-known *self-determination theory* for the purpose of studying SLA, examining how the various intrinsic/extrinsic components were related to orientations developed in L2 research, and how the learners' level of self-determination (i.e., autonomous self-regulation) was affected by various classroom practices. MacIntyre and his colleagues (e.g., MacIntyre et al. 1998, 2003) adapted McCroskey's notion of L1 *willingness to communicate* (WTC) to the study of L2 communication. Other researchers such as Dörnyei (2000, 2001; Dörnyei and Ottó 1998) Ushioda (2001) and Williams and Burden (1997) adopted a *process-oriented perspective*, highlighting the fact that an individual's motivation is never stable but continuously shows a certain degree of fluctuation. Still others linked motivation with various aspects of the learner's *identity*, either by adopting a postmodern, poststructuralist approach (e.g., Norton 2000, 2001; Pavlenko 2002; Ushioda 2007) or by drawing on social psychological research on the self (e.g., Higgins 1987, 1998; Markus and Nurius 1986) in conceptualizing *motivational self-guides* (e.g., Dörnyei 2005, 2009a) – I will come back to this latter strand below when discussing motivation-cognition overlaps and again later when describing higher-order amalgams of learner characteristics.

Problems with the Modular View of Individual Difference Variables

As the previous sections illustrated, the conceptualizations of language aptitude and motivation have been diverse over the years, and in fact, in a book-length overview of individual differences I have concluded that 'all the

variables described in this book are either in the process of, or in desperate need of, theoretical "restructuring"' (Dörnyei 2005: 218). Yet, at that stage I did not question the general concept of modular ID variables being the core building blocks of learner characteristics. Indeed, the notion of ID factors appeared to be solid and the ID concept had been well established in SLA research in a relatively straightforward manner: IDs were usually seen as background learner variables that modified and personalized the overall trajectory of the language acquisition processes, accounting for *why*, *how long and how hard* (motivation), *how well* (aptitude), *how proactively* (learning strategies) and *in what way* (learning styles) the learner engaged in the learning process.

Recently, however, I have come to a new understanding of individual differences and argued (Dörnyei 2009b) that the seemingly comprehensive and straightforward picture of IDs being stable and monolithic learner traits that concern distinct learner characteristics is part of an idealized 'individual differences myth' that may not hold up against scientific scrutiny. As far as I can see, the basic problem is that if we take a situated and process-oriented perspective of SLA – which I think we ought to – we simply cannot fail to realize that the various learner attributes are neither stable nor context-independent, but display a considerable amount of variation from time to time and from situation to situation. Furthermore, and what is particularly relevant to the current chapter, a closer look at both language aptitude and motivation reveals that neither construct is monolithic but is, instead, made up of a number of constituent components.

Kosslyn and Smith (2000) explain that cognitive abilities in general can be divided into 'lower' and 'higher' brain functions: Lower functions such as early perception and motor control rely on a relatively small collection of processes that display straightforward interactions. In contrast, higher functions are made up of the integrated operation of a relatively large numbers of processes, which may themselves have complex internal structures. It is clear that the ID variables that SLA research has been interested in – such as language aptitude and motivation – are complex, higher-order attributes, which was already recognized in the literature by the fact that – as shown above – neither language aptitude, nor L2 motivation has been seen as uniform, heterogeneous factors but rather composite measures. This is in line with Kosslyn and Smith's (2000) argument that higher-order learner characteristics comprise a selection of hierarchically organized and dynamically interacting sub-components.

Once we take such a multicomponential view of L2 ID factors, however, we are forced to move even further in our thinking because a closer look reveals that many (if not most) learner characteristics mentioned in the literature involve at one level or another the cooperation of components whose nature is very different from that of the main attribute in question – for example, motivational factors may involve cognitive constituents – resulting in 'hybrid'

attributes. This means that not only is the stable and context-independent nature of ID variables highly doubtful, but there are also serious questions about the whole theoretical foundation of the traditional view of individual differences as a modular collective of distinct ID factors. As a result, over the past two years I have come to conclude that the traditional conception of learner characteristics fuelled by the 'individual differences myth' does not do justice to the dynamic, fluid and continuously fluctuating nature of learner factors and neither does it account for the complex internal and external interactions that we can observe in higher-order intellectual functions (for specific illustrations of such interactions within SLA, see the next section below). The following description of motivation by Ellis and Larsen-Freeman (2006: 563) is, I believe, characteristic of ID variables in general: 'Motivation is less a trait than fluid play, an ever-changing one that emerges from the processes of interaction of many agents, internal and external, in the ever-changing complex world of the learner.'

As a result of these considerations, I have recently proposed the adoption of a new dynamic systems perspective on individual differences (Dörnyei 2009b), according to which individual variation in performance is not so much a function of the strength of any individual determinant (e.g., aptitude or motivation) as of the way by which the complex system of all the relevant factors works together. I will describe this dynamic view in more detail below, but before doing so let us have a specific look at the interaction and overlap of the two key learner characteristics in focus in this chapter, language aptitude – or more generally, cognition – and motivation.

Cognition-Motivation Interaction and Overlap in SLA Research

As mentioned in the introduction, a common conception of aptitude and motivation has been that the former is the most important *cognitive* variable, while motivation is the primary *affective* factor shaping SLA. They have traditionally been seen as distinct from each other with no interaction or overlap, and this view was formalized in Robert Gardner's socio-educational model of second language learning (Gardner 1985, 2005; Gardner and MacIntyre 1992, 1993), according to which 'there are two primary individual difference variables involved in language learning, viz., ability and motivation. These two factors are expected to be relatively independent because some students high in ability may be high or low in motivation for any host of reasons, and vice versa' (Gardner 2005: 5).

This traditional view has been questioned recently on a number of accounts. To start with, strictly speaking there is no such thing as 'language aptitude' or 'motivation', because we have seen above that both constructs are umbrella

terms subsuming a rather diverse range of factors. Therefore, proposing that aptitude and motivation are the two lynchpins of individual differences is problematic in itself. Furthermore, there is an obvious second concern with the cognitive/affective dichotomy of aptitude and motivation, namely that almost all influential contemporary motivation theories in psychology are cognitive in nature and affective (i.e., emotional) issues hardly ever feature on motivation research agendas. As Schumann (2004: 3) has concluded, 'motivation is not independent of cognition (as it is frequently treated in SLA research), but instead it is part of cognition, and therefore, there can be no "cognitive" approaches to SLA that do not include motivation.' If this is so, however, in what way is motivation different from language aptitude, which – as we have seen above – is the collective term used to refer to a mixture of cognitive factors?

The aptitude-motivation distinction becomes even more untenable if we look at the details of specific motivation constructs. What we find is that at one level or another certain established cognitive constructs play a salient role in determining the motivational outcome. Let me describe three examples of this motivation-cognition interplay: 'flow' (Csikszentmihalyi 2000; Egbert 2003), 'motivational task processing' (Dörnyei 2003; Dörnyei and Tseng in press) and the 'ideal L2 self' (Dörnyei 2005, 2009a).

Flow

The experience of 'flow' is a theoretically intriguing and intuitively appealing phenomenon, making its chief advocate, Mihaly Csikszentmihalyi (1990), both a bestselling author and a leading international psychologist. The popularity of the concept is due to the fact that it concerns a highly valued experience that many of us have had in the past: Flow entails a state of intensive involvement in and focused concentration on a task that feels so absorbing that people often compare it to being outside everyday reality. This state is, however, not the kind of passive spiritual experience that some people can evoke through meditation; to the contrary, flow is experienced while people are at their most active or creative, being engaged in completing an absorbing task. Thus, flow can be seen as a heightened level of motivated task engagement; in many ways it is the optimal task experience. It happens when, faced with a challenging activity, people are fully aware of what needs to be done and how, and at the same time they are confident that the task is doable and their skills are sufficient to succeed. An often mentioned feature of a fully fledged flow experience is that the extent of absorption can be such that people even lose self-consciousness and a track of time. While this may sound like a science-fiction fantasy, all we need to do is observe children (and even adults) playing computer games to realize that flow is a very real phenomenon.

In a pioneering study on the role of flow in SLA, Egbert (2003) found that the task conditions under which flow occurs can be organized along four dimensions: (1) there is a perceived balance of task challenge and participant skills during the task, (2) the task offers opportunities for intense concentration and the participants' attention is focused on the pursuit of clear task goals, (3) the participants find the task intrinsically interesting or authentic and (4) the participants perceive a sense of control over the task process and outcomes. These underlying dimensions display a balanced mixture of cognitive and motivational constituents (see also Guastello et al. 1999): While flow is usually discussed under the motivation rubric as a specific type of intrinsic motivation (explained by the experience of enjoyment that is one of the key features of flow), it is fundamentally determined by cognitive factors such as the appraisal of the challenge of the activity; the self-appraisal of the level of the individual's skills and competence involved in the activity; a firm sense of control over the completion of the task; clarity about the task goals; and focused attention. The reason why flow is a particularly good example for the integrated operation of motivational and cognitive aspects is that the flow experience can only occur if all these conditions are met; that is, the cognitive factors are prerequisites rather than mere modifiers of the motivational phenomenon.

Motivational Task Processing

In a recent study, Dörnyei and Tseng (in press) examined the validity of a theoretical construct that I proposed in 2003 concerning motivational task processing (Dörnyei 2003). As I argued then, the motivational dynamics of learning tasks are dependent on how the participating learners process the various motivational stimuli they encounter and, as a result, how they activate certain necessary motivational strategies. The construct suggests that L2 learners are engaged in an ongoing appraisal and response process, involving their continuous monitoring and evaluating how well they are doing in a task, and then making possible amendments if something seems to be going amiss. This process can be represented through a dynamic *task processing system* that consists of three interrelated mechanisms: *task execution*, *appraisal* and *action control* (see Figure 1).

Task execution refers to the learners' engagement in task-supportive learning behaviours in accordance with the task goals and the action plan that were either provided by the teacher (through the task instructions) or drawn up by the student or the task team. In other words, this is the level of actual 'learning'. *Task appraisal* refers to the learner's continuous processing of the multitude of stimuli coming from the environment regarding the progress made towards the action outcome, comparing the actual performance with the predicted or hoped-for ones or with the likely performance that alternative action sequences would

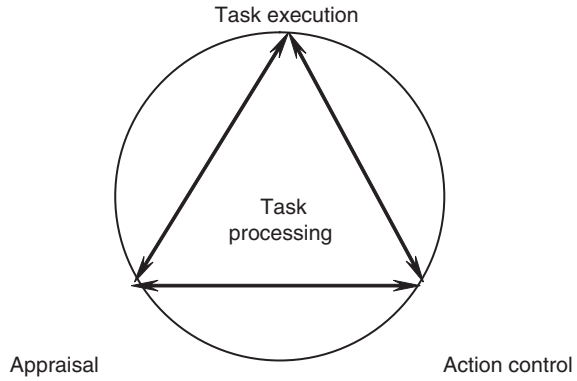

Figure 1 Schematic representation of the three mechanisms making up the proposed motivational task processing system

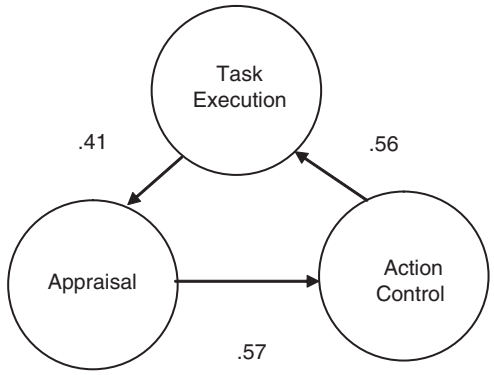

Figure 2 Structural equation diagram of motivational task processing (Dörnyei and Tseng in press)

offer. *Action control* processes denote self-regulatory mechanisms that are called into force in order to enhance, scaffold or protect learning-specific action; active use of such mechanisms may 'save' the action when ongoing monitoring reveals that progress is slowing, halting or backsliding.

Dörnyei and Tseng's (in press) validation study has involved a structural equation modelling (SEM) analysis of the proposed construct, and has confirmed the circular relationship of the three components (see Figure 2): Signals from the appraisal system concerning task execution trigger the need to activate relevant action control strategies, which in turn further facilitate the execution process. Thus, a process that is primarily motivational in nature relies heavily on a cognitive appraisal component. Interestingly, the inclusion of appraisal in

broader non-cognitive constructs is not unique to this example because, for example, most theoretical conceptualizations of emotion contain a cognitive appraisal component that is responsible for the evaluation of the situation that evokes an emotional response (Lewis 2005).

The Ideal L2 Self

The *ideal L2 self* is the central component of a new conceptualization of L2 motivation, the 'L2 Motivational Self System', which I proposed in 2005 (Dörnyei 2005). The main objective of developing the new construct had been to synthesize a number of influential approaches in the field (e.g., Gardner 1985; Noels 2003; Ushioda 2001) and at the same time also to broaden the scope of L2 motivation theory to make it applicable in diverse language learning environments in the current, increasingly globalized world (for a detailed description, see Dörnyei 2009a). The ideal L2 self is the L2-specific facet of one's *ideal self*, which refers to the representation of the attributes that someone would ideally like to possess (i.e., representation of hopes, aspirations or wishes) (see Higgins 1987, 1998; Markus and Nurius 1986). The theory suggests that if the person we would like to become speaks an L2, the ideal L2 self is a powerful motivator to learn the L2 because of the desire to reduce the discrepancy between our actual and ideal selves. This is expressed in everyday speech when we talk about someone following, or living up to, their dreams.

Thus, the ideal L2 self acts as a future self-guide, providing incentive, direction and impetus for action. However, past research has shown that the motivational capacity of this self-guide is not automatic but depends on a number of conditions; accordingly, the ideal L2 self is an effective motivator only if:

1. the learner *has* a desired future self-image;
2. which is elaborate and vivid;
3. which is perceived as *plausible* and is in harmony – or at least does not clash – with the expectations of the learner's family, peers and other elements of the social environment;
4. which is *regularly activated* in his/her working self-concept;
5. which is accompanied by relevant and effective *procedural strategies* that act as a *roadmap* towards the goal;
6. which also contains elaborate information about the *negative consequences* of *not* achieving the desired end-state.

What is important from our perspective is that the effective functioning of the ideal L2 self is dependent on the operation of several underlying cognitive components, most notably on the learners' self-appraisal of their capabilities

and evaluation of the affordances of their personal circumstances in order to anchor their vision in a sense of realistic expectations. As Pizzolato (2006: 59) puts it, 'The relation between what students want to become and what students actually become may be mediated by what students feel they are able to become'. In addition, learners also need a repertoire of task-related strategies that are activated by the priming of the ideal L2 self: Effective future self-guides need to come as part of a 'package', consisting of an imagery/vision component and a repertoire of appropriate plans, scripts and self-regulatory strategies (Dörnyei 2009a). In a study examining the relationship between motivation, cognition and action, Locke (2000) calls the knowledge of such strategies 'task knowledge' and he also argues that this knowledge illustrates the interdependence of cognition and motivation. This integrated operation of cognition and motivation is expressed clearly by Cross and Markus (1994: 434–435).

A possible self may serve as a node in an associative network of experiences, strategies and self-knowledge. In this way, the possible self may link effective steps and strategies . . . with beliefs about one's ability and competence in the domain.

Cognition-Motivation Overlap in Cognitive Psychology

The three examples described above offer specific illustrations of the interplay and cooperation of cognition and motivation in SLA, but this overlap is not restricted to L2 research. In the psychological literature we find many examples for motivation-cognition interfaces, and in a study specifically focusing on the integration of motivation and cognition, Bickhard (2003) argues that the common view of modelling motivation and cognition as distinct processes – 'motivation as some form of initiating and directing – pushing and pulling – behaviour, and cognition as the manipulation of encoded representations in memory' (p. 41) – is inaccurate and counterproductive because it makes it difficult to understand interrelationships between them or their interactions in behaviour and development. This claim was further substantiated in a high-profile volume edited by Dai and Sternberg (2004) on '*Motivation, Emotion, and Cognition: Integrative Perspectives on Intellectual Functioning and Development*'. As the title suggests, the contributors of this book – some of the best-known contemporary cognitive and educational psychologists – set out to present a powerful case for the need to view cognition and motivation as two interlocked facets of an integrated mental system, with emotion being a third constituent. In the Introduction, the editors summarize this objective as follows:

> In this introduction chapter, we attempt to make a case that intellectual functioning and development never occur as solely cognitive events but

> involve motivation and emotion, or the whole person vis-à-vis adaptive pressures and challenges. Going beyond cognitivism does not imply that motivational and emotional issues are more important than or as important as cognitive processes and mechanisms. Rather, our point is that without taking into consideration the motivational and emotional aspects of intellectual functioning and development, we cannot even properly understand cognitive processes involved. Reducing intellectual functioning and development to merely cognitive matters is simply no longer tenable both on theoretical grounds and in light of empirical evidence. (Dai and Sternberg 2004: 29)

Following the Introduction, the volume contains 12 further chapters on various cognition-motivation-emotion interfaces, ranging from motivational effects on attention, cognition and performance (Dweck et al. 2004) to the role of interest in combining affective and cognitive functioning (Hidi et al. 2004). Thus, this volume opens up a whole range of new perspectives and research agendas, providing support for Linnenbrink and Pintrich's (2004: 83) conclusion that the 'relation between affect and engagement as well as cognitive processing suggests that there may be a complex interplay among affect, cognition, and motivation that needs to be further investigated'. Although looking at cognition and motivation (and affect) in such a blended manner is still a very recent research orientation, it can potentially offer substantial gains because the evidence presented in the above volume and elsewhere in the literature leaves no doubt that the availability/allocation of cognitive resources is very closely linked to the direction, intensity and persistence of action, that is, with the traditionally conceived central motivational domains.

A Dynamic Systems Approach to Understanding Learner Characteristics in SLA

Having illustrated the reality of the cognition/motivation interface in SLA and having shown that the separation of cognition and motivation has been increasingly seen as an outdated and inaccurate conceptualization in cognitive and educational psychology, let us return to the question of adopting a new, dynamic systems perspective on individual differences as suggested earlier in this chapter. As I have argued (Dörnyei 2009b), the 'individual differences myth' claims that while the main trajectory of SLA is determined by language acquisitional processes, relatively stable and monolithic learner attributes – called individual differences – cause systematic deviations from the overall trend. However, when we look at them more closely, individual learner characteristics appear to be rather different from the meaning we tend to assign to them in

everyday parlance or in traditional professional discourse: They are not at all stable but show salient temporal and situational variation, and they are not monolithic either but constitute complex constellations that are made up of different parts that interact with each other and the environment synchronically and diachronically. As a result, simple cause-effect relationships are unable to do justice to these multi-level interactions and temporal changes. Instead, I would suggest, individual learner variation can be better accounted for in terms of the operation of a complex dynamic system in the sense that high-level mental attributes and functions are determined by an intricate set of interconnected components that continuously evolve over time and which also interact with the environment in an ongoing manner. The value of each constituent keeps changing depending on the overall state of the system and in response to external influences, making ID factors dynamic system variables. Therefore, the logical next step of conceptualizing individual differences is to attempt to reframe them within a dynamic systems perspective.

Although describing the nature and the operation of dynamic systems goes beyond the scope of this chapter (for L2-related overviews, see e.g., de Bot, Lowie and Verspoor 2007; Dörnyei 2009b; Ellis and Larsen-Freeman 2006; Larsen-Freeman and Cameron 2008; van Geert 2008), we can conclude that, broadly speaking, a system can be considered dynamic if it has two or more elements that are interlinked with each other and which also change in time. In such systems the complex interferences between the multiple system components' developmental trajectories make the system's behaviour unpredictable as it follows non-linear changes. In the social sciences, dynamic systems have been discussed by four interrelated theories: *dynamic systems theory*, *complexity theory, chaos theory* and *emergentism,* which can be seen as overlapping strands within the same broad theoretical family, each examining complex, dynamic, non-linear systems. While the four theories are associated with somewhat different research traditions and priorities, the labels describing them have not been used consistently across disciplines and in most cases the four theories converge in the same general non-linear systems approach.

Dynamic systems display – by definition – continuous fluctuation, yet a very important point from the perspective of this chapter is the fact that there are also times of seeming stability in most systems, when the system behaviour seems to be predictable. How can we explain these non-dynamic, settled states within a dynamic systems framework? The answer is provided by the concept of *attractors* and *attractor states.* These refer to preferred patterns to which the system is attracted (hence the name) and in which the elements are coherent and resist change. Not every system reaches such settled attractor states, but if there are strong attractors in place, a relatively wide range of starting points will eventually converge on a much smaller set of states because the process unfolds in the direction of the attractor (Nowak et al. 2005). In contrast, unstable

phases in the development of the system are characterized by weak or changing attractors. In the light of these considerations, it is not unreasonable to suggest that higher-order ID variables can be seen as powerful attractors that act as stabilizing forces; for example, a strong goal, incentive, talent or interest can definitely bring stability to the system of learner characteristics/behaviour, and this stability, in turn, translates into consistency and predictability (see Dörnyei 2009b).

A Tripartite Framework of Learner Characteristics

Given the dynamics of learner characteristics and the complex and interlocking nature of higher-order cognitive human functioning described above, is there any justification for proposing any macro-structuring principles to individual variation in human mental functions such as separating certain cognitive and motivational functions? In other words, if we look at the tapestry of human mental characteristics as an interwoven and fluid system, does it make any sense to keep speaking about any subsets of these characteristics (such as motivational or cognitive factors) as distinct entities? I believe that the answer is yes, because there is one perspective from which such a separation is justifiable: the *phenomenological* (i.e., experiential) perspective. Motivation and cognition can be differentiated from each other because they 'feel' different: If we want something, we have the distinct experience of 'wanting' it and we can even grade this experience in terms of its strength (e.g., *I can hardly wait . . .* or *I really-really-really want it!*); and similarly, cognition/thoughts also have their distinct experiential feel, which is revealed in phrases such as 'cold intellect', capturing a key feature of cognition, namely that it has no valence (i.e., it is not gradable in terms of intensity either in the positive or negative directions).

It is important to note here that in addition to these two basic types of mental functions (i.e., cognition and motivation), we can also identify a third salient phenomenological category, *emotions* or *affect* (e.g., fear, anger, distress or joy), that is clearly distinguishable from the previous two. Thus, although this chapter does not cover affective issues (for a review, see Dörnyei 2009b), it needs to be pointed out that emotions constitute the third main dimension of learner-based characteristics, adding up to a comprehensive, tripartite framework. Each of the three mental dimensions can be viewed as dynamic subsystems that have continuous and complex interaction with each other and which cannot exist in isolation from one another. As Buck (2005: 198) put it, 'In their fully articulated forms, emotions imply cognitions imply motives imply emotions, and so on'.

Interestingly, scholars have traditionally divided mental processes along this tripartite structure. Scherer (1995) explains that already Plato proposed that the human soul contained three components: *cognition* (corresponding to thought

and reason and associated with the ruling class of philosophers, kings and statesmen), *emotion/passion* (corresponding to anger or spirited higher ideal emotions and associated with the warrior class) and *conation/motivation* (associated with impulses, cravings, desires and associated with the lower classes). This division into 'an appetitive part that produces various irrational desires, a spirited part that produces anger and other feelings, and a reasoning part that permits reflection and rationality' (Parrott 2004: 7) has traditionally been referred to as the 'trilogy of mind', reflecting three interrelated but conceptually distinct mental systems.

In conclusion, I have been arguing above that the complex of learner characteristics can be best understood at the interface of two somewhat conflicting perspectives: On the one hand, given the integrated nature of mental functions, the modular view of individual differences – consisting of stable and monolithic personality traits – is untenable. This would suggest that there is not much point in examining factors such as language aptitude or motivation independently of each other. On the other hand, I believe that it is worth maintaining a broad, phenomenologically validated organizing framework of cognition, motivation and affect, as long as we recognize that these dimensions are best seen as interlocking complex subsystems.

Higher-Order Amalgams of Learner Characteristics

Where do all the above considerations leave us? What is the main advantage of introducing a dynamic systems perspective in the study of learner differences? It certainly won't make life easier for us, since thinking of the human mind in such an integrated way is admittedly rather difficult (for a discussion of this difficulty, see Dörnyei in press). Indeed, our natural tendency is to isolate the most relevant subsystem or factor and try to establish its impact on the phenomenon in focus (which is why we have so many studies on 'motivation and SLA' or 'language aptitude and SLA'). However, the problem with such a discrete treatment of dispositional attributes, as Lubinski and Webb (2003) conclude, is that examining them individually is often challenging and unfruitful, because the manner in which each operates depends on the full constellation of personal characteristics. As these authors conclude, even people with outwardly similar ID patterns can travel very different paths as a result of some difference in a personality constituent that is seemingly irrelevant or of secondary importance – this is exactly what dynamic systems theory would expect. This would imply, then, that trying to isolate discrete ID factors such as various aptitude or motivational components or cognitive styles is unlikely to take us too far. Instead, it is my belief that the best way forward is to identify

higher-level amalgams or constellations of cognition, motivation and affect that are relatively stable (i.e., are governed by a strong attractor) and which act as 'wholes'. In other words, and related to the specific topic of this chapter, if we can identify optimal combinations of cognitive and motivational (and emotional) factors, these can have the potential to work as powerful attractors, which would make the system of learner characteristics/behaviour predictable and therefore researchable.

Do we know of any such ID complexes from the literature? We do, and it is in fact a strong validity argument for the theoretical considerations described above that ID complexes of this sort constitute some of the most promising cutting-edge findings in the study of learner characteristics both in educational psychology and in SLA research. In the following I describe three such constructs: *aptitude/trait complexes*, the broad notion of *interests* and *possible selves*.

Aptitude/Trait Complexes

A central issue in ID research over the past decade, and one that has emerged in aptitude research in particular, has been the suggestion that although isolated ID factors and personality traits are often shown to have a substantial impact on learning outcomes, certain optimal combinations of such traits are likely to have more predictive power than traits in isolation. One researcher in particular, Richard Snow, was influential in highlighting the potential importance of such ID constellations, or as he called them, *aptitude complexes* (for an overview of the legacy of Richard Snow written by his former students and associates, see Corno et al. 2002). His initiative has been taken up by several of his followers because, 'Although isolated traits often have . . . substantial impact on learning outcomes, it may be that combinations of traits have more predictive power than traits in isolation' (Ackerman 2003, p. 92).

The best-known work to date along these lines has been Phillip Ackerman and his colleagues' conceptualization of 'trait complexes' (e.g., Ackerman 2003, 2005; Ackerman and Heggestad 1997; Ackerman and Kanfer 2004). These scholars have identified four broad trait complexes, called 'social', 'clerical/conventional', 'science/math', and 'intellectual/cultural'. They are made up of various combinations of cognitive abilities, personality dimensions and interests, and they function as 'wholes' in affecting the direction and intensity of the investment of cognitive effort and the type of knowledge/expertise acquired during adulthood. Interestingly, Ackerman (2005) stresses that these complexes are only the beginning, because they represent 'only a small sampling of underlying cognitive, affective, and conative communalities' (p. 104). Future, more principled research might be able to extend the current conceptualizations and

may add new ability trait operationalizations; Ackerman mentions 'emotional intelligence' as a likely candidate for the latter (for more information on emotional intelligence, see Dewaele et al. 2008).

In SLA, the notion of trait complexes has been addressed by Peter Robinson's (e.g., 2001, 2002, 2007) research programme on language aptitude-treatment interaction. He conceptualized language aptitude as the sum of lower-level abilities, grouped into cognitive factors, which differentially support learning in various learning situations/conditions. A particularly interesting feature of Robinson's proposal is his attempt to describe concrete sets of cognitive demands that can be associated with some basic learning types/tasks, and then to identify specific aptitude complexes to match these cognitive processing conditions. Robinson distinguished three conditions of exposure to input – implicit, incidental and explicit learning – and then discussed a number of *cognitive resources* (e.g., attentional or working memory capacity) and *primary abilities* (e.g., pattern recognition or processing speed) that combine to define sets of *higher-order abilities* directly involved in carrying out learning tasks (e.g., noticing the gap, or metalinguistic rule rehearsal). These second-order abilities can then be grouped into aptitude complexes that exert an optimal influence on learning in specific learning conditions, such as focus on form via recasts; incidental learning via oral or written content (by means of orally or typographically salient 'input floods'); and explicit rule learning.

Interests

The term 'interest' in the psychological literature is often used more broadly than, for example, the 'interest in foreign languages' category in Gardner's (1985) integrative motivation construct. It refers to a broad orientational dimension that has been found to be defined by six general interest themes: 'realistic' (working with things and tools), 'investigative' (scientific pursuits), 'artistic' (aesthetic pursuits and self-expression), 'social' (contact with and helping people), 'enterprising' (buying, marketing and selling), and 'conventional' (office practices and well-structured tasks) (Lubinski and Webb 2003). Some scholars have reduced these themes to two broad dimensions, 'people' versus 'things' and 'data' versus 'ideas', and the strength of the people/thing factor is evidenced by the fact that, as Lubinski and Webb (2003) describe, it displays some of the largest sex differences discovered by psychological science on a continuous dimension (with women towards the 'people' end of the cline, and men towards the 'things' end). Interests are heritable, are predictive of a broad spectrum of criteria in areas ranging from educational and vocational settings to activities in everyday life (hobbies and pastimes), and the concept appears to

be theoretically more straightforward and temporarily more stable than several other ID factors.

Lubinski and Webb (2003) report an interesting longitudinal study in which they compared, over a period of 10 years, the developmental trajectory of three different types of profoundly gifted individuals. The three groups consisted of students who were (a) high on mathematical reasoning and relatively low on verbal reasoning; (b) high on verbal reasoning and relatively low on mathematical reasoning; and (c) high on both abilities. As could be expected, the abilities acted as strong attractors for long-term development, and differential interests were apparent in the three groups in their choice of favourite courses in high school and college, as well as in the awards and other accomplishments they achieved: high-math individuals tended to succeed in areas of science and technology, whereas high-verbal individuals tended to succeed in the humanities and arts. This study provides a clear illustration of how long-term interests are made up of a combination of cognitive and motivational factors.

Possible Selves

Possible selves represent the individuals' ideas of what they *might* become, what they *would like* to become and what they are *afraid of* becoming (Markus and Nurius 1986). The novelty of the possible self concept lies in the fact that it concerns how people conceptualize their as-yet unrealized potential and as such, it also draws on hopes, wishes and fantasies. In this sense, possible selves act as 'self-guides', reflecting a dynamic, forward-pointing conception that can explain how someone is moved from the present towards the future. From an educational perspective the most important possible self is the 'ideal self', which has already been described earlier when illustrating the cognition-motivation interaction in the L2 field. It was pointed out there that the ideal L2 self is a powerful motivator to learn the L2 because of the desire to reduce the discrepancy between our actual and ideal selves.

Although in my 'L2 Motivational Self System' (Dörnyei 2005) I emphasized the motivational capacity of the ideal L2 self, possible selves present broad, overarching constellations that blend together motivational, cognitive and affective areas. Already the originator of the concept, Hazel Markus (2006), pointed out that the possible self-structure could be seen as a 'dynamic interpretive matrix for thought, feeling and action' (p. xi), and I have demonstrated earlier that the ideal self does indeed have a salient cognitive component. In addition to this, MacIntyre et al. (2009) also highlight the emotional aspect of possible selves, because without a strong tie to the learner's emotional system, possible selves exist as 'cold cognition, and therefore lack motivational potency'

(p. 47). As the authors explain, 'When emotion is a prominent feature of a possible self, including a strong sense of fear, hope, or even obligation, a clear path exists by which to influence motivation and action' (p. 47).

Finally, this cognition-emotion-motivation amalgam features a further significant dimension, a salient *imagery* component: Markus and Nurius (1986) emphasize that possible selves involve tangible *images* and *senses*, as they are represented in the same imaginary and semantic way as the here-and-now self; that is, they are a *reality* for the individual: people can 'see' and 'hear' a possible self. In this sense, possible selves are not unlike visions – an Olympic athlete's ideal self is not merely an intellectual goal but a vision of him/herself walking into the Olympic Stadium, completing the race and then stepping onto the top of the podium. As Markus and Ruvolo (1989: 213) summarize, 'imaging one's own actions through the construction of elaborated possible selves achieving the desired goal may thus directly facilitate the translation of goals into intentions and instrumental actions', and a similar idea has been expressed by Wenger (1998: 176) when he described the concept of 'imagination':

> My use of the concept of imagination refers to a process of expanding our self by transcending our time and space and creating new images of the world and ourselves. Imagination in this sense is looking at an apple seed and seeing a tree. It is playing scales on a piano, and envisioning a concert hall.

Thus, in many ways it is the integration of fantasy with the self-concept construct that marks Markus and Nurius's (1986) work as truly innovative (Segal 2006). This is certainly the aspect that grasped my own attention when I first encountered this work, and this is, I believe, what makes the concept of possible selves a particularly powerful ID constellation that encompasses the whole spectrum of the human mind, from our thoughts and feelings to our senses.

Conclusion

I pointed out in the introduction of this chapter that the task of addressing the relationship between aptitude and motivation goes beyond merely looking at two specific ID factors, as it concerns, in effect, the broader examination of how individual difference variables in general are related to each other and how they exert their cumulative impact. I further argued that the traditional notion of individual difference factors conceived as stable and monolithic learner characteristics that act as modifying filters in the SLA process (i.e., the 'individual differences myth'), is untenable because it ignores the multicomponential

nature of these higher-order attributes and because the constituent components continuously interact with each other and the environment, thereby changing and causing change, and subsequently displaying highly complex developmental patterns. The study of such complex constellations of factors requires a dynamic systems approach, and this perspective would suggest that identifying 'pure' individual difference factors has only limited value both from a theoretical and a practical point of view; instead, a potentially more fruitful approach is to focus on certain higher-order combinations of different attributes that act as integrated wholes.

In the light of this theoretical backdrop, specifying the relationship between language aptitude and motivation – which has been the specific theme of this chapter – requires a new, integrated approach whereby we focus on the blended operation of cognition and motivation rather than the discrete treatment of the two ID variables. Thus, I do not believe that it is a particularly worthwhile scientific endeavour to examine the impact of isolated areas of L2 aptitude or motivation; instead, we should try and identify viable constellations whereby the cognitive and the motivational (and also the emotional) subsystems of the human mind cooperate in a constructive manner. This chapter presented several concrete illustrations of the reality and validity of such an integrated approach and I do hope that these have convinced the readers that this admittedly difficult agenda is worth pursuing.