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A Holistic Person-Centred Approach to Mobile Assisted Language Learning

Peng, Hongying

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CHAPTER 3

A holistic person-centred approach to Mobile-Assisted Language Learning²

Abstract | For many decades, quantitative second language (L2) researchers have been operating under the assumption that group averages reveal something about the individuals comprising the population on which they are based. In this chapter, we will constructively contest this assumption and offer an augmentative theoretical and methodological framework that emphasizes person-centredness (Benson, 2019). Research has increasingly shown that L2 learning and use are essentially individually owned. This is perhaps especially the case in today's technologized world where L2 learners have access to diverse and myriad learning resources that articulate with their personal goals, learning interests and preferences, prior knowledge, language and digital competencies. It is with this contemporary context in view that we present an innovative and holistic person-centred account of language learning with technology. With a focus on individuals, the person-centred approach views each individual as a relationally constituted whole, where intra- and extra-individual attributes and resources are understood to form an entangled system that jointly contributes to the process of individual development. With a brief discussion of an empirical example of a clustering approach to analysing learning experiences mediated by mobile technology, this chapter elucidates how the application of person-centred methods can help to advance our

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understanding of complex L2 phenomena. The conclusion discusses implications of the person-centred approach for L2 research and teaching.

3.1 Introduction

There is a growing acceptance of the view that language, as a complex and adaptive system, is interrelated with and embedded in our cultural, sociological and psychological lives (see Verspoor, 2017; Five Graces Group, 2009). In such a view, language learning is recognized as a dynamic process that results from an interplay of a wide range of learner-internal and -external variables as well as their simultaneous interaction with the learning environment (e.g., de Bot et al., 2007). Considering that the number of variables at play and the way in which they interact are usually different for different learners, learners tend to show distinctly different processes of language learning and development (Verspoor et al., 2017). Especially in today's globalized and technologized world, learners have available a multiplicity of language learning resources through which to explore personal learning goals, interests, and preferences, and which potentially expand upon prior knowledge, language abilities, and digital competencies (Kukulska-Hulme, 2016; Thorne, 2008).

Emerging technologies integrate diverse online resources and provide learners with opportunities for communication, interaction, and collaboration with people from remote corners of the globe, creating conditions under which the boundaries between classroom-based guided learning and autonomous learning in learners' everyday lifeworlds are blurred (Thorne, 2013; Thorne et al., 2015). Concomitant with global changes afforded by (mobile) technology are learners' pursuits of differentiated learning goals. That is, today's multilingual and technology-supported culture is redefining when, why, and how languages are learned and used (Chinnery, 2006; Larsen-Freeman, 2017; The Douglas Fir Group, 2016). In direct application to our study, Kukulska-Hulme (2016) further recognizes that digital language learning using mobile technologies offers an augmented potential for personalization. To cope with the increasing complexity and diversity of language use in the 21st century, taking a holistic approach that simultaneously examines individual learners and their interdependence with spatial-temporal context is warranted. This focus on the individual operating contingently in a spatial-temporal context redirects second language (L2) research to "a more person-centred frame of reference" (Larsen-Freeman, 2018, p. 60).

It is from this perspective that we present here an ecological and person-centred account of language learning in a technologized society. By focusing on individual learners, the person-centred approach views each individual as a functioning whole in interaction with components of larger

systems that jointly contribute to the process of language development. Specifically, we pursue an integrative consideration of learners' attributes (e.g., motivation, emotion, autonomy) and the contexts through which they emerge and evolve. In providing this explication we have two main aims: first, to advance our understanding of language learning in an increasingly technologized world, with a specific emphasis on mobile technologies; and, second, to develop innovative means for addressing the complexity of L2 learning phenomena that adequately account for individual variability and differing developmental trajectories. As noted by Verspoor et al. (2009), aspects of the publicly available linguistic environment are not uniformly noticed or passively absorbed by groups or communities. Rather, living persons variably interact with text, talk, and other semiotic resources. This results in potentially divergent learning and developmental processes where the 'same' input may be acted upon in different ways that are contingent upon a person's immediate learning goals and interests. In this sense, the meaning making experiences of persons in interaction with other persons form complex and adaptive systems that reorganize themselves based on the contingencies of the immediate goal-directed activity at hand.

In this chapter, we begin with an overview of the nature of the person-centred approach, including provisional definitions at the theoretical and methodological level, and the situation in which this approach could be used as a complementary or alternative tool to the standard variable-centred approach in the L2 field. We then discuss methodological decisions essential for conducting person-centred research and present an empirical study as illustration of this methodology. We conclude by highlighting issues we believe have important implications for future L2 research.

3.2 Conceptual and analytical unit: From the variable to the person

There is consensus in the L2 field that learners exhibit differential success in their L2 learning. To elucidate why this is the case, abundant research has been conducted to investigate individual differences (ID) such as age, aptitude, motivation, emotion, learning belief, and the use of learning strategies (see Dornyei & Ryan, 2015). Studies have identified important factors that contribute to successful L2 learning, positively informing L2 research and pedagogy. However, quantitatively examining learners at the group level obscures learner diversity and can overshadow individual learning processes (Benson, 2019; Murakami, 2020). In addition, the dynamic nature of ID factors has gradually been acknowledged as non-stable, interconnected, and contingent on context (Lowie & Verspoor, 2019), which problematizes research methodologies that treat variables as inviolate conceptual and analytic units.

Recent studies that adopt a complex dynamic systems perspective have shown that L2 learning, use, and development are unique to each individual (Bulté & Housen, 2020b; Verspoor et al., 2017). Different learners, even those appear highly similar in terms of the factors/variables under investigation, tend to present distinct learning processes and developmental trajectories over time (Lowie & Verspoor, 2019). These individualized language learning and development have been largely side-lined in the SLA field's search for causal language learning variables at the group level (Larsen-Freeman, 2001). Although group studies remain useful for identifying factors influential for L2 learning, use, and development, research efforts should equally attend to the processes of individual learning and development which involve an intricate interplay of learner attributes (e.g., motivation, emotion, aptitude, and learning style) with the spatial-temporal contexts of human activity (e.g., Wind & Harding, 2020). This shift of focus from the variable to the individual ushers in a new person-centred era in L2 research (Benson, 2019; Larsen-Freeman, 2018).

3.3 A person-centred approach: Theoretical and methodological levels

The person-centred approach views each individual as a dynamic system, with interwoven components jointly contributing to the process of individual development. By “components”, we mean, for example, learning behaviours, learning motivation, learner emotion, and learning contexts. They are traditionally viewed as distinct variables influential for L2 learning, but in the person-centred approach they are used to construct individuals' learning and developmental patterns and should be interpreted as constituted in relation to each other. In other words, the indivisibility of components is core to a person-centred perspective. This view is related to complex dynamic systems theory (CDSST) thinking that has gradually been embraced in the L2 field. Bergman and Magnusson (1997) presented four basic tenets of this approach as follows:

- (1) The process is partly specific to individuals.
- (2) The process is complex and is conceptualized as involving many factors that interact at various levels which may be mutually related in a complicated manner.
- (3) There is a meaningful coherence and structure (a) in individual growth and (b) in differences between individuals' process characteristics.
- (4) Processes occur in a lawful way within structures that are organized and function as patterns of operating factors, where each factor derives its meaning from its relations to the others. Although there is, theoretically, an infinite variety of differences with regard to process characteristics and observed states at a detailed

level, at a more global level there will often be a small number of more frequently observed patterns ('common types'). (p. 293)

The above tenets describe a research focus on the individual and the associated phenomenal-experiential processes and practices. More specifically, each individual is seen as a functioning totality that can be studied by analysing his/her learning and developmental patterns. The identification of typically occurring patterns could reveal subgroups of learners who share those patterns. Searching for typical or salient patterns also receives support from the study of language as complex dynamic system. One characteristic of the language system is self-organization, which refers to a process of spontaneous emergence of new patterns (van Geert, 2008) that arise from the interplay of learners' internal and external attributes and resources. From this perspective, we could envision certain states (or what are called "attractors") to occur more frequently than others, corresponding to the aforementioned typical patterns.

Essentially, we could argue that understanding individual development, language development included, lies in a detailed examination at the individual level, with a focus on learning and developmental patterns. By way of classifying individuals with shared patterns into groups, distinct self-similar subgroups can be identified and a careful generalization of individual cases can thus be made.

3.4 Classification and person-centred methods

As the person-centred approach values patterns of components and recognizes them as the basic unit of analysis and interpretation, a focal subject of this approach is to classify individuals who share similar patterns into different groups (Bergman et al., 2003). Classification is a welcomed method in other fields, such as biology and psychology. For instance, individuals are often grouped into different personality types based on their shared traits (Csizér & Dörnyei, 2005).

With regard to classification issues, several methods are available, but their central concepts usually remain isomorphic. One of the concepts is similarity. To classify learners/patterns based on similarity, one could consider cluster analysis (CA). As a statistical technique, CA can "provide a bottom-up way" (Staple & Bieber, 2015, p. 243) of identifying non-overlapping clusters/groups wherein the individuals have similar typical patterns. The clustered learner groups diverge largely from the learner groups targeted in traditional group studies. In traditional group studies, it is the researcher who selects or creates learner groups based on pre-conceived categorizations, while person-centred methods identify learner groups composed of similar learning patterns that emerge from the data (Bergman & Magnusson, 1997; Lee et al., 2019; Papi & Teimouri, 2014). In this

section, we will first focus on the clustering in the cross-sectional dimension, which is later used as a building block for longitudinal clustering.

3.4.1 Cross-sectional clustering

L2 learning is essentially a complex and dynamic phenomenon, and in light of the person-centred approach we mentioned earlier, L2 research should focus on the individual, the process, and the learning pattern (see also Bergman & Lundh, 2015). As such, it is informative to search and analyse learning patterns that emerge from the data. For example, by way of grouping L2 learners into different types based on their similarly structured learning patterns, cross-sectional clustering can provide a nuanced picture of learner complexity and diversity in a systematic manner. A case in point would be Papi and Teimouri (2014), who conducted a cluster analysis of L2 motivation with a view to identifying different learner types with distinct motivational characteristics. The clustering procedure yielded five self-similar learner types that are varied in terms of their motivational configurations. They further identified how the five types were different in their motivational, emotional, and linguistic characteristics.

The establishment of different learner types provides an approach for researching complex L2 phenomena with practical implications for L2 instruction. By acknowledging the typically occurring patterns specific to each learner type, adaptive and personalized instruction compatible with the characteristics and needs of each learner type can thus be tailored and employed to gain optimal learning outcomes. We suggest more studies that adopt a clustering technique in the L2 field.

3.4.2 Longitudinal clustering

Although Papi and Teimouri's (2014) study convincingly illustrated the applicability of the cluster analysis (i.e., a person-centred method) in L2 motivation research, they collected data indicating L2 learners' motivational, emotional, and linguistic states only at one time point, neglecting the fact that these learner attributes, from the complex dynamic systems perspective which their study took, may not be stable but rather fluctuate over time (Dörnyei et al., 2014). The unstable nature of these attributes entails a process aspect of the person-centred approach, where a longitudinal clustering methodology is much needed.

Longitudinal cluster analysis is often incorporated in situations where multiple data gathering occurs across time (Bergman & Wångby, 2014). As mentioned earlier, if we adopt the person-centred approach, L2 developmental trajectories for individuals show variability since interacting

attributes and resources are contingent upon local conditions and hence differ across individuals (Lowie & Verspoor, 2019; Verspoor et al., 2017). As such, the individual is at the core of understanding L2 learning and development and longitudinal case studies provide a significant source of insight into the L2 learning and developmental process (Lowie, 2017). Findings from cases that present shared longitudinal patterns can be aggregated and generalized. Ideally, a longitudinal data set with the same components measured at all time points would provide an accurate model of the individual's complete developmental patterns. However, in practice, a comprehensive fine-grained longitudinal person-centred analysis is not logistically feasible. Additionally, the results from numerous individual cases are often heterogeneous, hard to interpret, and challenging to generalize from.

A remedy for this might be a cross-sectional pattern analysis followed by linking over time (Bergman & Magnusson, 1997). That is, cross-sectional clustering of learning patterns could first be carried out at each time point. What follows could be to link learner types/clusters at time 1 to learner types/clusters at time 2, and then a link between learner types/clusters at time 2 to those at time 3, and so on. Between each adjacent pair of time points, cluster membership should be cross-tabulated to give information about cluster membership combinations that occur more often than expected by chance (so-called developmental types) and to look for individual stability (i.e., belongs to similar clusters at both time points) or dynamic changes.

One example is Piniel and Csizér's (2015) examination of changes in motivation, anxiety and self-efficacy. By adopting a longitudinal clustering technique, they analysed whether persons in a given cluster remain in that group or jump to another cluster over time, the underlying idea being that "development is not always gradual (but is not always a matter of qualitative shifts, either) and development is clearly different between individuals, but also shows general patterns or prototypical trajectories" (van Geert, 1994, p. 14). Therefore, the patterns of movement across clusters were called trajectories in their study. To capture the dynamic nature of the changes over time, Piniel and Csizér (2015) used the clustering results of the data collected at the first time point as the initial clusters for the second wave. In doing so, the study helped to unravel how interacting motivational, affective and cognitive factors shaped learners' distinct learning patterns over a semester and how the learning patterns changed over time. Diverging from prior work that revealed a negative correlation between motivation and anxiety, Piniel and Csizér (2015) found the existence of different motivation-anxiety relations for different learner types. Specifically, a trajectory with high motivation and low anxiety was more typical and less variable than another trajectory wherein learners showed both high motivation and high anxiety. Their findings disavowed the linear

relationship between variables that had long been held in L2 research and rather illustrated the power interrelationship dynamic among various attributes (Lowie et al., 2017). This research suggests that a longer period of investigation with multiple points of data collection would yield a more intricate picture of developmental changes. Therefore, focusing on learning process and applying longitudinal clustering analysis has the potential to provide insightful results, revealing the mechanism of multicausality and embedded and relationally constituted systems of L2 phenomena.

3.5 Empirical illustration: Latent profiles of mobile language learners

3.5.1 Background

To elucidate how to apply a holistic person-centred approach to L2 learning in today's globalized and technologized world, we present an empirical example of clustering learners' selective use of mobile technologies in their language learning. It should be noted that the data reported here are mainly collected for the empirical study to be introduced in Chapter 4 (with a totally different focus) where much more detailed information will be provided. As the person-centred approach recognizes language learning as a process of dynamic interactions between individuals' internal (e.g., motivation, emotion, and aptitude) and external (e.g., learning context) attributes and resources, it logically follows that language knowledge is related to learners' everyday experience with goal-directed communication. With today's easy access to mobile technologies, learners' daily experience with language has expanded enormously. Taking this into account, this chapter focuses on L2 learning and use that are mediated by mobile technology and that occur outside the classroom.

Our investigation of learners' informal mobile language learning also arises out of an increasing recognition that informal language learning constitutes an important, or even "predominant", part of "adult (i.e., second) language acquisition and learning" (Dressman, 2020, p. 3). As emerging mobile technologies bring abundant opportunities for L2 learning and use, learners have immediate access to diversified and inexhaustible online resources that could serve to provide authentic language input, an essential element for L2 learning (Verspoor, 2017). Previous research has confirmed the effectiveness of mobile technologies in L2 learning (Burston, 2015; Sydorenko et al., 2019; see also Chapter 2 for a meta-analysis), and examined the factors that moderate the effectiveness of the mobile-assisted language learning (MALL) (e.g., Kim et al., 2013; Xu & Peng, 2017). However, these explorations can only provide a partial and crude account of the nature of learners' language learning with mobile technology. Examination of learners' selective appropriation of mobile learning resources (i.e., their lived experience with mobile technology resources) might help to better understand the nature and quality of learners' mobile language

learning (Lai et al., 2018). Acknowledging learners' selective engagement with varied learning activities afforded by the mediation of mobile technology could also help teachers better integrate learners' preferences with classroom instruction (Reinders & Benson, 2017).

In this chapter, we apply Nation's (2007) four-strands principle to guide our interpretation of learners' experiences of informal mobile learning activities, as this principle can "usefully be applied when learners take control of their own learning" (Nation & Yamamoto, 2012, p. 173). In Nation and Yamamoto's (2012) view, a good language learner should allocate equal amount of time to activities representing meaning-focused input (MFI, e.g., reading and listening), meaning-focused output (MFO, e.g., speaking and writing), language-focused learning (LF, e.g., vocabulary, grammar, pronunciation), and fluency development (FD, e.g., activities involving the use of known language knowledge). We thus categorize the activities into MFI, MFO, LF, and FD strands. Considering that the MFI and MFO activities somewhat overlap with activities of the FD strand in the mobile learning context (see Nation & Yamamoto, 2012), we discuss FD in reference to a combination of MFI and MFO activities. Specifically, this chapter examines, from a person-centred perspective, whether and to what extent L2 learners differ in their selective use of mobile technologies for language learning in their lifeworlds. The person-centred approach posits that, although each learner may have his/her own distinctive motives, attitudes, and favoured ways of processing language information, there may still exist learners who share common attributes or patterns in their learning experiences. With the empirical illustration presented in this chapter, we wish to show the existence of, and to identify the number and composition of, different learner types with distinct mobile learning patterns. Ultimately, it is hoped to show how a person-centred point of view can help advance our understanding of complex L2 phenomena.

3.5.2 Method

In our application of a person-centred approach to identifying different learner types, two steps were involved. First, we examined the existence of different learner types based on the similarities and differences of learners' informal participation in varied mobile learning activities with a clustering technique, and uncovered the ways in which these learner types differed from each other. Second, the differences between the learner types were further tested with variables indicative of learners' linguistic, motivational, and emotional characteristics, following Alexander and Murphy's (1999) suggestion. According to Alexander and Murphy (1999), a good way to confirm the validity of group differences would be to compare the groups in terms of other independent variables.

3.5.3 Sample and relationally constituted variables

Questionnaire data were collected from 238 Chinese EFL learners who were averaged 19 years old, all freshmen from different disciplines (e.g., Economics, Horticulture, Law, Physics, and Veterinary Medicine). They had limited use of English for communication and the medium of their in-class instruction was Chinese (i.e., their L1).

The questionnaire (see Appendix B) included items concerning participants' mobile learning experiences, learning motivation and emotion, as well as their self-reported English proficiency. Mobile learning experiences encompass varied learning activities that are mediated by mobile technology, such as watching English movies and television series, listening to English songs and news, chatting in English over WeChat (a social communication app), etc. These activities may help to practice learners' reading, listening, writing, and speaking, as well as other language features (e.g., vocabulary, grammar, and pronunciation); therefore, we, in light of the four strands principle presented in section 3.5.1, categorized these activities into meaning-focused input (including reading- and listening-related activities), meaning-focused output (including writing- and speaking-related activities), language feature-based learning (including activities related to vocabulary, grammar, and pronunciation), and fluency development (a combination of meaning-focused input and meaning-focused output). Participants were asked to select the specific learning activities they engaged in for their practice of reading, listening, writing, speaking, and for their learning of language features (e.g., grammar, pronunciation, vocabulary) respectively. They were also required to report the amount of time they spent on practicing each English skill every day on a 6-point Likert scale (1 indicating *no time spent*, 2 indicating *within ten minutes*, 3 indicating *ten to thirty minutes*, 4 indicating *thirty minutes to one hour*, 5 indicating *one to two hours*, and 6 indicating *more than two hours*).

Learner motivation was operationalized in line with Dörnyei's (2009) L2 Motivational Self System. The variables indicative of learner motivation and emotion included *Ideal L2 Self* (5 items, indicating learners' aspiration and desire for language learning), *Ought-to L2 Self* (6 items, measuring the attributes that one believes one ought to possess in order to avoid possible negative outcomes), *L2 Learning Experience* (6 items, concerning learners' attitudes, as well as situation-specific motives, related to the immediate learning environment and experience), *Motivated Learning Behaviour* (8 items, examining the regulation of one's learning behaviour), and *L2 Anxiety* (8 items, assessing the "degree of anxiety [in English], as evidenced by negative performance expectations and social comparisons, psychophysiological symptoms, and avoidance behaviours" (Horwitz & Young, 1991, p. 37). Another 6-point Likert scale was used for the measure of the items, with 1 indicating *strongly disagree* or *not at all* and 6 referring to *strongly agree* or *very much*. English proficiency, as an indicator

of participants' linguistic states, was self-assessed by the participants based on a criterion-referenced self-assessed checklist (i.e., DIALANG statements in CEFR, Council of Europe, 2001). Also 6-point Likert scale was used for this self-assessment, with 1 indicating *very poor* and 6 referring to *very good*.

3.5.4 Data analysis and findings

The data concerning participants' mobile learning experiences were cluster-analysed (i.e., hierarchical clustering) using R 3.5.0, which led to the emergence of six self-similar clusters (i.e., learner types). Descriptive results are presented in Table 3.1. Significant differences between the clustered learner types were checked by means of one-way analyses of variance (ANOVAs). The group differences were further tested on variables indicative of participants' motivational, emotional, and linguistic characteristics (Alexander & Murphy, 1999), as shown in Table 3.2. Additionally, close examination of the specific learning activities each type of learners engaged in also revealed distinct learning patterns. As a result, it was decided that the six clustered learner types exhibited meaningful distinctions and the learners in each type were strongly self-similar. It should be noted here that the contents included in Table 3.1 and Table 3.2 will be represented in Chapter 4 with detailed statistic results. It is not our intention to repeat ourselves; rather, we believe by including these tables in both chapters we may present our ideas or arguments in a much clearer way.

Table 3. 1 Descriptive results of the six clustered learner types

Learner Types (N)	Type 1 (53)	Type 2 (74)	Type 3 (18)	Type 4 (16)	Type 5 (49)	Type 6 (28)
	M(SD)	M(SD)	M(SD)	M(SD)	M(SD)	M(SD)
Reading	1.06(.23)	2.69(.93)	1.61(.77)	4.38(.95)	3.45(.58)	4.14(.80)
Listening	1.53(.69)	2.39(.77)	4.50(1.09)	4.31(.87)	3.10(.62)	4.79(.63)
Speaking	1.23(.54)	1.72(.60)	2.67(1.13)	1.69(.79)	3.04(.49)	3.82(.72)
Writing	1.15(.41)	1.62(.59)	2.33(1.13)	2.31(.87)	3.16(.62)	3.54(1.13)
Language features	1.28(.53)	2.08(.85)	2.11(1.13)	3.25(.93)	3.43(.67)	4.32(.90)

Table 3. 2 Descriptive results of each type's linguistic, motivational, and emotional states

Learner	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Types(N)	(53)	(74)	(18)	(16)	(49)	(28)
	M(SD)	M(SD)	M(SD)	M(SD)	M(SD)	M(SD)
L2Proficiency	2.73(.79)	2.90(.79)	3.10(.65)	3.40(.96)	3.27(.66)	3.56(.62)
Ideal L2 self	3.47(1.26)	3.52(1.00)	3.72(1.31)	4.32(1.19)	3.74(1.05)	4.14(.77)
Ought-to L2 self	2.82(.95)	3.02(.98)	2.92(1.06)	3.17(1.32)	3.00(.91)	2.86(1.08)
Attitude	3.02(.90)	3.50(.72)	3.63(1.09)	4.16(.67)	4.05(.88)	4.28(.84)
Motivated behaviour	3.46(.96)	3.87(.76)	4.02(1.03)	4.16(.62)	4.31(.89)	4.20(.72)
L2 Anxiety	3.97(1.16)	3.75(.91)	3.77(.75)	3.42(.85)	3.53(.87)	3.14(.79)

Generally, Type 1 learners had the lowest scores in almost all language activities, which means that learners of this group spent little time learning English outside the classroom. According to the four strands principle, to learn a new language well, learners should allocate equal and considerable amount of time to MFI activities, MFO activities, LF activities, and FD activities (Nation & Yamamoto, 2012). Since Type 1 learners lacked adequate practice in all language aspects, this learner type was thus labelled the –MFI, –MFO, –LF, –FD type. This is also the type of learners who had the lowest level of self-reported English proficiency and learning motivation, but showed the highest level of anxiety. One possible explanation is that these learners did not see the relevance of English to their daily life or to their future life, and they did not enjoy English learning but rather regarded it as a school obligation (McCarty et al., 2017).

Type 2 learners (henceforth the +MFI, –MFO, +FL, +FD type), though also spending little time practicing speaking and writing, were different in their allocation of time—about half an hour every day—for reading, listening, and vocabulary learning respectively. Of all learners surveyed in this study, 31% belonged to this learner type, potentially representing a large portion of EFL learners in China. They had a relatively large amount of language exposure but limited use of English for communication. This receptive nature of language learning usually leads to a large observed gap between their comprehension and production (Wen, 2018). A similar learning pattern was found in Type 4 learners (henceforth the ++MFI, –MFO, +FL, ++FD type), except that Type 4 learners engaged in MFI activities to a larger extent. That is, although spending little time on speaking and writing practice, Type 4 learners practiced their reading and listening for one and a half hour every day respectively, and then learned vocabulary, grammar, and pronunciation for

another half an hour. This learning pattern (i.e., with a particular focus on receptive skills and language features) might be ascribed to Chinese students' learning style. It is widely acknowledged that students from Confucian heritage cultures such as China and Japan are often found compliant and receptive in their language learning (McCarty et al., 2017).

Although Type 2 and Type 4 learners similarly had a high level of anxiety, they diverged in their self-reported English proficiency and learning motivation. It appears to be case that learners' engagement with learning activities is positively related to their language proficiency and motivational levels, which mirrors Ma's (2017) findings in her multi-case study. Ma (2017) examined how mobile technologies mediated Hong Kong college-level students' L2 learning, and found that students' selective use of varied e-resources and tools was an outcome of the interaction of an array of factors, such as language proficiency, learner motivation, learning belief, study discipline, personal interests and goals.

An ideal learning pattern (i.e., in line with the four strands principle) was found in Type 5 learners (henceforth the +MFI, +MFO, +FL, ++FD type). These learners distributed comparably large amount of time (about half an hour every day) to learning each language aspect. That is, Type 5 learners equally practiced their reading, listening, writing, speaking, and language features on their own initiative, with the help of mobile technologies. Again, a similar pattern was observed in Type 6 learners (henceforth the ++MFI, ++MFO, ++FL, +++FD type). Similarly, these learners performed varied learning activities related to different English skills to a larger extent; that is, this is the type of learners who devoted the largest amount of time to practicing each strand of activities: about two hours every day on MFI (i.e., reading and listening), two hours on MFO (i.e., speaking and writing), and one and a half hours on LF (i.e., vocabulary, grammar, and pronunciation).

Interestingly, Type 5 and Type 6 learners were similar not only in their learning pattern, but also in their linguistic, motivational, and emotional characteristics. The main differences between the two learner types lay in their engagement with specific learning activities. While Type 6 learners were more traditional and less creative in their selection of specific learning activities (e.g., watching videos, listening to audio, and searching e-news websites), Type 5 learners displayed a higher level of curiosity, and awareness of the affordances of mobile technologies for language learning and the potential technological resources available (Demouy et al., 2016). In other words, Type 5 learners showed more dynamism in their choice of learning activities enabled by mobile technologies. For example, they liked to practice writing via online forum discussion, and were willing to use WeChat Public Platforms to practice their reading, listening, and specific language features (e.g., vocabulary, pronunciation). As mobile technologies advance rapidly, this learner type

might benefit more from the appearance of new resources and mobile activities. Previous studies (e.g., Lai & Gu, 2011) revealed a limited use of web 2.0 technologies in language learning. According to our study, it makes sense to empower this type of learners with more meta-cognitive, self-regulating capabilities to embrace web 2.0 technologies. The distinction between Type 6 and Type 5 learners also mirrors different views on language learning (a more conservative view vs. a more open and socially integrated one). Although both are forms of out-of-class language learning, the former seems to reflect more how learners learn in class while the latter is more likely to be a form of social learning. Although it is not necessarily the teacher's responsibility to organize learners' mobile learning outside the classroom, teachers may also be able to help learners develop a more integrated view of traditional learning and innovative learning, thus better exploiting the learning potential of emerging mobile technologies (Kashiwa & Benson, 2018).

Learner Type 3 (henceforth the ++listening, +MFO, +FL, ++FD type) is another cluster that emerged from the data. These learners spent about half an hour every day on the MFO strand and LF strand. What seems surprising was their overemphasis on listening practice. They had about one and a half hours every day allocated to listening to English materials. When looking closely at their preferred learning activities, listening to English songs stood out, which corroborated the view that "learners have their preferred channels to receive and process learning resources, in the form of online reading (textual), videos (visual) or songs (auditory)" (Ma, 2017, p.198). The observation that learners listened primarily to music also illustrates the potential of popular culture resources for language learning (Dubriel & Thorne, 2017).

To summarize, by adopting a person-centred method (i.e., cluster analysis), this study revealed six distinct learner types whose learning patterns were mediated differently by their selective use of mobile technologies. It also presented how these differential learning patterns were related to their motivational, emotional, and linguistic profiles. In doing so, we were able to extend previous general conclusions that mobile technologies can potentially facilitate learners' language learning (e.g., Burston, 2015), minimize their fear of embarrassment, and raise their motivation for language learning (e.g., Ma, 2017). It further elucidated how learners' attributes (e.g., motivation, emotion, and language proficiency) interacted with varied technological resources to give rise to differential learning patterns that are specific to each learner type. In other words, the application of clustering techniques can shed light on the latent learner types that can easily be overshadowed by the aggregated data obtained at the group level.

3.5.5 Implications

Our identification of different mobile learner types with a person-centred methodology has several implications for future L2 research and pedagogy. First, L2 learning, from a person-centred perspective, should be understood at the individual level as a process of many interrelated components jointly contributing to, and co-evolving throughout, the developmental process. Research describing and explaining individual trajectories of observed sub-system components and the clustering procedure described in this study could also be applied to diachronic developmental processes, with a view toward identifying ideal-typical trajectories and factors that account for the change or stability of these trajectories.

Second, we suggest that the clustering procedure we discussed above could complement standard variable-centred analysis of experimental data. Prior to an intervention or a treatment, researchers could first issue a series of pre-tests and questionnaires to collect data on individual differences and could use clustering techniques to ascertain if the participants/learners can be clustered in meaningful ways (see Staples & Biber, 2015, for similar suggestions). Researchers could then examine possible interaction effects between different learner types and the intervention, which could provide valuable findings regarding personalized instruction and the design of more effective learning materials, tools, and task types.

Third, a person-centred study could also be appropriately viewed as a needs analysis for task-based language teaching (TBLT) and research (González-Lloret, 2014). The design of a TBLT curriculum, as proposed in Norris (2009), begins with an analysis, ideally multi-methodological, of learners' needs, wants, and goals (see also Long, 2005). The clustering technique could potentially reveal learner types and their distribution, all profiled with distinct cognitive, motivational, emotional, and linguistic characteristics, which together further lays the foundation for identifying pedagogical tasks L2 learners could perform to amplify their learning potential.

Fourth, as learners' use of mobile technologies in language learning potentially blurs the boundary of formal and informal learning, acknowledging the existence of different learner types with distinct informal mobile learning patterns could help L2 teachers design a better integration between their in-class guidance and learners' self-initiated learning outside the classroom (Wong et al., 2015), which mirrors Thorne and Reinhardt's (2008) call for bridging activities that incorporate learners' digital expertise, experience, and curiosity with instructor guidance, and hence helps L2 educators to engineer optimal conditions for language learning (see also Reinhardt & Thorne, 2019). Collectively, a teacher's job is no longer to teach but to create environments that maximizes learners'

agentive role in language learning and which ecologically aligns with their personal interests and present as well as future needs (see Kassenberg et al., 2020, for detailed practice).

3.6 Future directions and conclusion

3.6.1 Theoretical implications of the “person-centred” approach

To clarifying the definition of person-centred, a clear distinction should be made between the theoretical and methodological aspects of the person-centred approach. Statements like “cluster analysis” (e.g., Papi & Teimouri, 2014) or “clustering technique” (e.g., Lee et al., 2019) only imply the person-centred approach by the method it uses, ignoring the theoretical dimension. The person-centred approach, as proposed in this chapter, is grounded in the complex dynamic systems paradigm (de Bot et al., 2007; Larsen-Freeman & Cameron, 2008), which recognizes L2 learning as an individual learner’s use of language in spatial-temporal contexts (Larsen-Freeman, 2018).

This recent focus on individuals in context has been described as the era of “person-centredness” by Benson (2019), which he contrasts to earlier eras such as “the invisible learner” and “learner-centredness”. A person-centred approach understands L2 learning, use, and development at the individual level by regarding each individual as a functioning whole with its components (e.g., cognitive, affective, motivational, and linguistic variables) jointly contributing to what happens in the individual’s developmental process. Given that the number of interacting components and the way in which they interact are usually different for different learners, L2 learning trajectories often differ across individuals (Lowie & Verspoor, 2019; Verspoor et al., 2017).

3.6.2 Reconsidering issues of data aggregation

Conventional research on L2 learning is often based on group studies with an assumption that results obtained at the group level can be generalized to each individual. However, the person-centred perspective eschews the practice of overdetermined generalization, as learning patterns are often found to differ across individuals and contexts. The proposed invalidity of generalizing group findings to the individual is elaborated in Lowie and Verspoor’s (2019) discussion on the ergodicity problem. Lowie and Verspoor (2019) argued that the generalization of group observations across individuals can only be made under two conditions: the learner group is homogeneous and each individual’s learning process remains stable. In view of the individualized nature of L2 learning, both conditions are likely to be violated, as “a randomized group is most probably not homogenous and the data are not stable” (Lowie & Verspoor, 2019, p. 192).

Rather than using aggregated data with the whole group, our suggestion is to identify distinct and arguably self-similar subgroups. Molenaar and Campbell (2009) similarly suggest that generalization to the wider population can possibly be achieved “through the identification of subsets of similar individuals” (Molenaar & Campbell, 2009, p. 116). This type of generalization begins with an identification of subgroups of learners, each subgroup with similarly structured individuals. As such, findings of each identified subgroup could possibly be proximally generalized to the individual within it and vice versa. It should be noted that we are not saying that a standard variable-centred study at the group level is inferior to the person-centred approach. While research efforts are still needed to identify new variables influential for successful L2 learning with group studies, research focus should also include examining the individual in context by taking a person-centred approach.

3.6.3 The need for intensive studies of individual development

When individual development is the focus, it is not evident that the conventional longitudinal approach, which is often characterized as group-based and with relatively few measurement points, is adequate. To better illuminate details of individual development, it is necessary to study the dynamics of change in the developmental process. To achieve this, Lowie (2017) proposes longitudinal case studies with intensive (frequent) and temporally arrayed sampling. We acknowledge that intensive data collection with many measurement points are logistically difficult to obtain, which further restricts the learners that can be included in such research. A good compromise, as exemplified in Lowie and Verspoor (2019), would be to embed a small sample of intensively studied persons within a conventional group study. The group study could provide us with valuable information about the relative weight of individual variables that are influential for L2 development, while the longitudinal case studies shed light on the process of individual development, and potentially, and reveal relatively homogeneous ideal-typical subgroups.

The application of an ecological and person-centred approach means not rejecting but rather complementing the L2 frameworks developed in recent decades so as to optimally respond to the realities of our highly mobile, globalized, and digitalized world, in which millions of people endeavour to learn new languages, in different instructional settings, and for different reasons. Ultimately, we hope to draw from descriptively oriented longitudinal case studies and cluster analyses in order to better engineer conditions for language learning, both within and outside of instructional settings.

