Background

The age factor in second language acquisition (SLA) is a very controversial topic. The basic facts are agreed, admittedly. Short-term research into naturalistic acquisition and long-term research into formal learning show adult and adolescent second language (L2) beginners progressing more rapidly than children, and older children progressing more rapidly than younger children in the naturalistic domain. The balance of evidence seems to broadly favor the eventual attainment-focused line taken by Krashen, Long, and Scarcella back in 1979, namely that in situations of naturalistic exposure, while older beginners tend to outperform their juniors—at least in some respects—in the initial stages of learning, with regard to long-term achievement on the whole, the earlier exposure to the target language begins the better the outcome. The debate is about the extent to which it is possible in certain circumstances for naturalistic late starters to match the performance of naturalistic early starters. As far as instructed L2 learning is concerned, the consistent finding emerging from studies as early as the 1970s (e.g., Burstall et al., 1974; Oller & Nagato, 1974) is that pupils who receive early classroom exposure to an L2 do not maintain an advantage for long over later beginners.

However, the place of the age factor in a treatment of individual differences is not beyond dispute. Age is, admittedly, usually viewed as an “individual difference”—along with “abilities”, “propensities”, “learner cognitions/beliefs about L2 learning”, and “learner actions/strategies”. R. Ellis (2006), however, disagrees with this perspective:

… “age” itself does not belong to any of the four categories; rather, it potentially affects learners’ abilities, propensities, cognitions, and actions (as do other factors such as previous learning experiences and the learning situation).

(p. 529)

He claims that “the role played by age in L2 acquisition warrants an entirely separate treatment” from individual differences (p. 530).

It used to be almost universally assumed that physical aging, physiological maturation, was the cause of age effects in language acquisition. This was the line taken, for example, in Lenneberg’s (1967) Critical Period Hypothesis. In recent times, however, the age factor has been deprived of its status as a simple physiologically induced variable and has been rechristened as a “macro-variable” (Flege et al., 1999)—a complex, sociocultural variable. Age researchers are now calling for dimen-
sions other than the passing of years to be taken into account. On this, many proponents of the critical period hypothesis (CPH) (e.g., Montrul, 2008, 2012) as well as CPH skeptics (like Moyer, 2013, 2014) agree. Montrul (2008) acknowledges that age “cannot be isolated from other co-occurring factors” (p. 50). For Moyer (2013), multiple variables are involved, “having to do with learner orientation and experience” (p. 1). Birdsong (2018) describes the age of onset as a “proxy for the L2 acquisition initial state” (p. 2), i.e., the sum of an individual’s cognitive, neurological, and linguistic development, along with motivational, identificational, attitudinal, and experiential characteristics at the point at which L2 learning begins. According to this perspective, L2 learning is suggested to be unlike learning other skills—a unique endeavor both constrained and facilitated by the psychological, social, and cultural factors specific to certain contexts (e.g., Ushioda & Dörnyei, 2012).

The general perspective across most theoretical positions is that researchers need to attend to age-related social, psychological, and contextual factors as well as to strictly maturational factors—for example, positive/negative attitudes, willingness to risk-take, degree of cultural openness, commitment of time and/or energy, itinerary of identity construction, nature of support systems, number and depth of friendships with target language speakers, degree of need to fit in, and degree of richness/variety of input. This implies that physical age at the beginning of acquisition does not determine non-native-likeness as suggested by the maturational constraints position (Muñoz, 2019). The focus on experience in interaction with the age factor in language acquisition and processing also provides a source of evidence bearing strongly upon issues in theories of L2 acquisition.

Interest in the age factor in SLA started with the pronouncements of Penfield (Penfield & Roberts, 1959) and Lenneberg (1967: cf. Hyltenstam, 2012), who believed that physiological processes accompanying maturation determined child–adult differences in SLA development. For Penfield, the optimal period for language acquisition ceased after age nine when “for the purposes of learning languages, the human brain becomes increasingly stiff and rigid” (Penfield & Roberts, 1959, p. 236). This notion inspired Penfield to promote early foreign language instruction. His views on brain plasticity conflict with current wisdom, which is that the brain remains plastic throughout life (Gutchess, 2014; Ramírez Gómez, 2016; Raz & Lindenberger, 2013), as do his views on the benefits of early foreign language instruction (see below). Lenneberg is well-known for such assertions (1967, p. 176) as after puberty “the incidence of ‘language-learning-blocks’ rapidly increases and ‘[f]oreign accents cannot be overcome easily’. He explained these problems in terms of the process of lateralization of language functions to the brain hemisphere dominant for language, which he thought was completed by the “critical age” of puberty. Lenneberg’s version of lateralization is no longer supported by neuroscientists; current research suggests a complex, multifactored relationship between lateralization and age (see, e.g., Nenert et al., 2017).

The age factor is no longer seen as simply interacting with other individual characteristics but as in a real sense deriving its influence on SLA from this interaction. Individual difference (ID) variables do not supplant age effects; rather, they interweave with age-related constraints and exert a differential impact on learners of different ages across different settings. Note that Bylund et al. (2020) juxtapose, in their literature review, Pfenninger and Singleton’s school-based study with Birdsong’s (2018) discussion of age of acquisition effects and bilingualism effects in naturalistic learning, in the same inventory, disregarding what many advocates of maturational persuasion do not—namely, the very different conditions and outcomes attaching to naturalistic versus instructional conditions.

Research

Evidence

We begin with a summary of the general findings on age and SLA. These are complex—remote from the simple “earlier = better” slogan of the days of Penfield & Roberts (1959) and Lenneberg
Age

(1967). We focus on the maturational hypothesis that has been applied to naturalistic SLA. The broad pattern is that short-term naturalistic studies and long-term formal instructional studies show adult and adolescent L2 beginners progressing more rapidly than children, and older children progressing more rapidly than younger children. Naturalistic studies suggest, however, that the younger a start is made to L2 acquisition, the higher the level of proficiency likely to be eventually attained (Muñoz & Singleton, 2011), the higher the self-perceived competence in the L2 (Dewaele, 2010) and the higher the probability that the L2 user will choose the L2 to communicate emotions (Hammer & Dewaele, 2015), although native-like attainment is not impossible for older starters. In children who grow up bilingual (whether sequential bilinguals or child L2 learners), a younger age of acquisition is not necessarily predictive of better language outcomes in all circumstances in immersive contexts at home (see, for e.g., Blom & Paradis, 2016). On the contrary, older age can mean more cognitive resources for learning language. In these learning contexts, age is thus described as being multifaceted and indexical not only of maturational effects and plasticity but also of changing availabilities of cognitive and environmental resources, and growing connectivity as a function of environmental stimuli (Blom & Paradis, 2016; Paradis et al., 2016). Concerning language learning among senior adults, research is in its infancy, but it is clear already that aging is not the impediment it was once thought to be (see Gabrys-Barker, 2018; Kliesch et al., 2018; Pfenninger & Singleton, 2019a; Singleton & Zaborska, 2020).

The Naturalistic Situation

As already indicated, we shall deal here with age in a naturalistic setting, going on in the next section to deal with age in an instructional context—at both ends of life—under “practical applications”. The naturalistic evidence indicates that the “earlier = better” dictum is broadly plausible from a long-term perspective. It is favored by the findings of classic immigrant studies (e.g., Asher & García, 1969; Hyltenstam, 1992; Patkowski, 1980; Piske et al., 2002; Seliger et al., 1975). Asher and García (1969) showed the age of arrival in the US to be a better predictor of English pronunciation than the length of residence; Hyltenstam (1992) found a higher level of lexical and grammatical errors in Swedish among immigrants who had arrived in Sweden after age seven; Patkowski’s (1980) results showed a negative relationship between English syntactic rating and the age of arrival in the US; Piske et al. (2002) found the English vowel production of early bilinguals to be more native-like than that of late bilinguals; and Seliger et al. (1975) in interviews found that most of those who had migrated to Israel or the US before age nine perceived themselves to be native speakers of English/Hebrew, whereas most of those who had migrated at or after age 16 felt they still had a foreign accent. Generally, it seems younger arrivals in a country where the dominant language is different from the immigrants’ home language are more likely than older arrivals to eventually pass for native speakers of the new language.

On such observations rests the CPH, the notion that biological aging constrains what is attainable by language acquirers beyond a certain point. The question is: what point, or, at what points? Singleton (2005) mentions and critiques the “multiple critical periods” idea—recently revived by Granena and Long (2013), who point to three sensitive periods, closing, according to their analysis, first for phonology, then for lexis, and finally for syntax. The multiple CPH, however, is beset by mixed evidence and counter-evidence. For example, the platitudinous notion that in order to attain a native-like accent one has to begin one’s experience in early childhood has been repeatedly challenged by Bongaerts’ studies (e.g., 1999, 2003) and by Moyer’s work (e.g.,1999, 2004, 2013, 2014), which showed clearly that post-pubertal L2 learners were very often judged by native speakers to have native accents. As for the notion of a clear dividing line between lexis and syntax (cf. Singleton, 2021), this was disconfirmed by the work of Sinclair (e.g., 1991) and Hoey (e.g., 2007), and was buried deep by emergent grammar (see, for e.g., Lantolf & Thorne, 2006) and the usage-based perspective on language knowledge (e.g., N.C. Ellis, 2017).
As Aram et al. stated some years ago, “the end of the critical period for language in humans has proven … difficult to find, with estimates ranging from one year of age to adolescence” (1997, p. 85). Puberty remains the most popular candidate for the end of “language readiness”. However, individual variation in puberty onset, the generally later occurrence of puberty in boys than in girls, and the increasingly early onset of puberty in girls in many cultures (see, e.g., Roberts, 2013) mean that puberty fails to pinpoint a particular age. Another complication is that different aspects of language proficiency have been claimed to be affected by age—e.g., phonology (Scovel, 1988), basic communicative skills (Cummins, 1979), and implicit mechanisms only (DeKeyser, 2000). Also, with increasing age of onset (AO), L2 results become more dispersed, goals for L2 learning become more diverse, and there is an increase in inter-individual effects of progressive cognitive decline, progressive L1 entrenchment, and education on L2 attainment (Birdsong, 2018).

Furthermore, different statistical methods applied to the same data may result in different shapes of the AO-attainment function (Birdsong, 2018; Vanhove, 2013), thus introducing an additional dimension of inter-individual variability. Studies using partial correlations or regression analyses (e.g., Abrahamsson, 2012; DeKeyser, 2000; DeKeyser et al., 2010; DeKeyser & Larson-Hall, 2005; Granena & Long, 2013; Johnson & Newport, 1989) suggest that the maturation of the brain is a strong explanatory candidate for AO effects. However, there is the fallacy of confusing correlation coefficients with slopes in CPH studies that compute and compare correlation coefficients between age of arrival (AoA) and ultimate attainment (UA) for two or more AoA subgroups in naturalistic settings (for a detailed discussion of this, see Vanhove, 2013). The fallacious assumption here is that differences in correlation coefficients are indicative of differences in slopes. “Lower correlation coefficients in older AoA groups may be largely due to differences in UA [ultimate attainment] variance … Greater variability in UA with increasing age is likely due to factors other than age proper, such as the concomitant greater variability in exposure to literacy, degree of education, motivation and opportunity for language use, and by itself represents evidence neither in favor of nor against the CPH” (Vanhove, 2013).

The “earlier = better” tendency in naturalistic SLA is only a tendency. Not all immigrants arriving in their host country in childhood attain native-like mastery of the language of the country, and those who arrive later do not necessarily fail to acquire the level of proficiency reached by younger arrivals. Take the case of the 20 late-L2 acquirers in Kinsella and Singleton’s (2014) study. In the identification of regional accents and a lexico-grammatical test, three of them scored within native-speaker ranges on all tasks. Such results do not undermine the CPH for its staunchest advocates (e.g., Abrahamsson & Hyltenstam, 2009; Long, 2013), for whom the criterion for falsification is “scrutinized native-likeness” with regard to every linguistic feature in the later learner (Abrahamsson & Hyltenstam, 2009). Birdsong (2014, p. 47) comments that, because of the mutual influence of a multilingual’s knowledge of his/her languages, and the fact that the L2 will inevitably be affected by such influence, “nonnativelikeness will eventually be found”, so that if “across-the-board nativelikeness is required to disconfirm the CPH, the CPH is invulnerable to falsification”.

Nativelikeness (see, e.g., Long’s 1990, 1993 nativelikeness paradigm) as a criterion, however, is extremely difficult to establish (see Pfenniger & Singleton, 2021). Thus, both monolingual native speakers and L2 users exhibit grammatical usages and representations of linguistic structure that would normally count as erroneous (see Dabrowska, 2012). According to Cook’s (2016) multicompetence perspective, neither one of an L2 user’s languages can be expected faithfully to resemble the native language of monolinguals (see Cook, 2002). Interaction between competencies inevitably has effects on language production (see, e.g., Jarvis & Pavlenko, 2008). Birdsong (2008, p. 22) argues that “minor quantitative departures from monolingual values are artefacts of the nature of bilingualism, wherein each language affects the other and neither is identical to that of a monolingual”. Recent work in translanguaging (e.g., Li Wei, 2018) supports Cook’s and Birdsong’s insights.

Younger L2 starters’ eventual outperformance of older starters in a naturalistic environment seems to be partly attributable to how they experience the L2. In immigrants, for example, profi-
ciency attainment in the host country’s language may derive from developmental differences relating to linguistico-cultural identity. For example, Jia and Aaronson (2003) found that the children among their participants sought more contexts of L2 use than the adolescents, having a higher number of L2-speaking friends, the adolescents choosing more L1-speaking peers as their friends.

Some studies also show that maturation is not necessarily determinative in SLA and that a strong socio-affective factor often underlies success in this connection. For example, in Muñoz and Singleton’s (2007) study, where the participants were 12 female late learners of English, generally rated as having foreign accents, two of them scored within the native-speaker phonological range, both of whom had very close affective contact with English-speakers, as a fiancée and a wife respectively. In Kinsella and Singleton’s (2014) study, the three participants who scored within the native-speaker range all conducted their social life primarily through the target language and had life partners from the target community. Moyer (2013, 2014) propounds the view that attainment in additional languages is a function of language experience, rather than simply a matter of maturation. She comments that “insights from the empirical research highlight these relationships between age, affect and linguistic experience, signaling a welcome shift in the critical period paradigm” (Moyer, 2013, p. 19).

**Instructional L2 Learning in Childhood and Adolescence**

Understanding the nature of the age factor is crucial for both SLA research and pedagogy, raising important concerns about all aspects of curriculum development and its adaptation to different ages (see DeKeyser, 2013). Around the time of Penfield’s advocacy of early L2 learning began a trend towards reducing the starting age of L2 school instruction, which recently has spread all over the world and accelerated dramatically (see, e.g., Murphy, 2014). This is not informed by relevant research. It actually flies in the face of a five decades-long empirical finding that pupils who receive L2 instruction at primary school do not maintain the advantage of their early start by the end of secondary schooling. This emerged from research by, for example, Burstall (1975) and Carroll (1975) and has unfailingly been the finding since. Later beginners, who experience markedly less learning time, turn out in due course to be equal or superior to the earlier beginners across a wide range of measures (see Muñoz & Singleton, 2011, 2019).

Probably the most impressive evidence of the “later = better” phenomenon came from two major projects conducted in Spain in the early 2000s—at the University of the Basque Country and the University of Barcelona—on the introduction of English as a foreign language to children at different ages. The Basque project compared the progress of 11-year-old beginners with that of eight-year-old beginners and four-year-old beginners across a wide range of measures, holding the number of hours of instruction constant. The findings were that the older beginners consistently outperformed the younger beginners (Cenoz, 2003a, 2003b; García Lecumberri & Gallardo, 2003; García Mayo, 2003). Much the same picture emerged from the Barcelona Age Factor Project (Muñoz, 2003) involving initially beginners of age eight and age 11. Again, the older learners significantly outperformed the younger learners across a range of tests, the one exception being a comprehension test involving selecting the appropriate picture, where the older learners scored higher, but not significantly so. An interesting recent confirmation of such findings is to be found in the study of Jaekel et al. (2017), which focused on the early receptive skills of two cohorts of English language learners in Year 5 (beginning of secondary education in Germany) and two years later in Year 7. The factors distinguishing between these two cohorts were the onset of foreign language education and the amount of language exposure. Their results are in line with the vast body of research showing older learners to be at an advantage (in the long run) in learning a foreign language over students in early foreign language education with minimal input.

The Beyond Age Effects (BAE) study (Pfenninger & Singleton 2017, 2019c) examined the effects of an earlier start (age eight) and a later start (age 13) of the school learning of English.
as a foreign language in Switzerland. It gathered cross-sectional data from 636 secondary-school students and longitudinal data from a further 200 learners. The findings provided no evidence of a lasting advantage accruing from an early beginning to the school L2 experience. In the first year of secondary school, the early starters (with five years’ more experience of school exposure to English than the later starters) demonstrated clearly superior lexical knowledge to that of the late starters. After just six months, however, the later starters had caught up with the early starters and sometimes overtaken them in some domains. The later starters also demonstrated a faster rate in the acquisition of morpho-syntactic forms selected on the basis of past research to cover the spectrum of difficulty for late L2 learners (Bialystok & Miller, 1999; Flege et al., 1999; Johnson & Newport, 1989; McDonald, 2000). All age-related differences between the two groups disappeared over the course of secondary school.

Such findings are possibly attributable to variables other than AO (e.g., teaching approach). Interestingly, the BAE study did show the earlier starting experience to be beneficial for one particular learner group: simultaneous bilinguals who were biliterate and had also received very substantial parental support. This group, like the other early starter groups, had benefited from five extra years of instruction compared to the later starters, differing from the other groups in that they managed to retain some of this advantage. The parents of these bilingual, biliterate participants reported a very positive, active role in their children’s learning and multilingualism.

This reported intense parental role may partly explain the differential age effect. Parental involvement in the group in question approximated to naturalistic conditions regarding affective dimensions and the sense of personal and family relevance with which it must have imbued English. In naturalistic conditions, young L2 acquirers are usually aware of their family’s approval of—and stake in—their L2 proficiency because of its usefulness to the family. When parents intensively encourage and support school learning of an additional language, the child may have a similar sense of their learning having family relevance. Learners who receive such support should perhaps then rather be grouped with naturalistic rather than straightforwardly instructional learners.

The BAE study also revealed that school/class context and climate interact with student-level variables such as AO: students under conditions of different school context and school climate demonstrate different educational attainment irrespective of AO—with implications for policy makers, administrators, teachers, and parents (Pfenninger, 2017). Furthermore, results of multilevel analyses revealed the wider school context to have a mediating effect on the relation between AO and L2 proficiency (growth), exerting both positive and negative influences and thus suggesting malleability of AO, which is typical of ID variables. Moreover, not only did different structures show different sensitivity to age of acquisition (see—e.g., DeKeyser, 2012) but also different tasks/skills. By contrast, no such effect could be observed with lower-level data, as learners within classes did not vary with regard to sensitivity to AO, which is explainable in terms of leveling effects resulting from the integration of early and late starters in the same classes. It is thus important in institutional environments that age effects be considered in light of macrocultural and microcultural phenomena bearing on interpersonal relations which influence variables like motivation that interact with age.

Immersion and Age

We have been dealing thus far with instruction where the target language is treated as just one school subject among many. In some situations, however, pupils are immersed in the target language, i.e., the target language is the language, or one of the languages, in which school instruction takes place. The question of whether an early start yields advantages in such cases has received a negative response. For example, in Harley’s (1986) study, her comparison of early immersion and late immersion students showed the late immersion students doing generally better (after 1,000 hours). In her comparison of two late immersion groups one with and the other without early partial immersion...
experience the group with early partial immersion experience performed better—unsurprisingly, given their extra target language exposure, but their lead was limited and inconsistent. A frequent finding is that older immersion learners are as successful as younger immersion learners despite shorter periods of immersion (e.g., Swain & Lapkin, 1989; Turnbull et al., 1998). However, the opposite has also been found. In Pfenninger (2020, 2021), one of the main questions was whether advantages are associated with the early provision of bilingual education with respect to the rate and outcome of L2 learning. The analysis of dense measurements over up to eight school years in (pre)primary school revealed, inter alia, that the behavior of age of onset (AO) in immersive school contexts was reminiscent of both naturalistic and instructional contexts: while there was no significant difference between children who began the partial CLIL program at the age of five and children with AO seven, children with AO nine lagged behind significantly throughout primary school with respect to the overall height as well as the shapes of their L2 trajectories.

Supporters of the CPH have largely accepted evidence of the failure of early L2 instruction to deliver long-term advantages over later L2 instruction. Thus, Johnson and Newport recognize “early instruction does not necessarily have the advantage for ultimate performance that is held by early [naturalistic] immersion” (Johnson & Newport, 1989, p. 81). DeKeyser (2003) argues that school-based L2 learning is typically explicit in nature and for this reason largely unaffected by maturational constraints. In an article proposing an agenda for age factor research relating to instructional L2 learning, Singleton and Pfenninger (2019) simply ignore the CPH. Their reasons are threefold. First, they refer to CPH claims being widely regarded as irrelevant to instructed L2 learning. Second, they cite the variety of positions about when the offset of the critical period is and what it is supposed to affect, which renders difficult the suggestion of feasible investigations of the topic. Third, they argue that many of the important age-related issues in the L2 instruction area are simply not relatable to the CPH.

**L2 Learning in Senior Adulthood**

With regard to L2 learning in late adulthood, research has recently been increasing (see Pfenninger & Singleton, 2019a). There are doubts about whether “a phenomenon as complex as adult learning will ever be explained by a single theory, model or set of principles” (Merriam, 2001, qtd. in Knowles et al., 2005, p. 1). There has been little investigation of individual differences among older L2 learners, research concentrating on executive function, field dependency, educational level, working background, hearing loss, and hearing loss treatment (Giroud et al., 2018; Kliesch & Pfenninger, under review; Pot et al., 2018; Ramírez Gómez, 2016; Serafini, 2017).

Brändle (1986) wrote of older foreign language learners’ experiencing difficulties with auditory imitation, responding orally and memory work, as well as apprehension concerning learning conditions. This last problem Brändle linked to the strangeness of the learning environment, but others have discussed it in terms of age-related defeatism, which appears to afflict many third-age learners (Andrew, 2012; Roumani, 1978; Schleppegrell, 1987). Older learners often seem to believe that aging cannot but have a negative impact on their L2 learning—with consequences for their engagement in learning activities (Ramírez Gómez, 2015, 2016). Regarding aural–oral problems, there is a decline in auditory acuity starting at the end of childhood (see Singleton & Ryan, 2004, p. 119), which in many third-agers may impact the oral–aural dimensions of L2 learning.

Regarding memory, the cliché is that our memory worsens with age. For people with dementia, this is true, influencing perhaps folk wisdom in this matter. Older people’s own judgments about their memory may wrongly attribute all memory lapses to age (cf. Hertzog & Dunlosky, 1996), and among the general population, memory problems are frequently judged harshly in older age groups (cf. Erber et al., 1990). The key to the relationship between aging and memory is widely taken to lie in working memory (see also Chapter 3 by Wen and Jackson), responsible for the temporary manipulation and maintenance of information during cognitive operations. While
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performance on comfortably paced working memory tests does not apparently decline much with age, performance on timed tasks does decline (Salthouse & Babcock, 1991; Wingfield et al., 1988), although some argue that this slowing down is occasioned by “retrieval interference” (McElree & Dyer, 2013). Recent research suggests that working memory can be improved by training and experience (cf. Singleton, 2017). The implications of this for third-agers are unclear, especially given the unclarity surrounding the role of working memory in L2 processing in later life (see Wright, 2015).

There may actually be no neurobiological evidence for any declines in the processing capacities of older adults “except … where there is evidence of pathology” (Ramscar et al., 2014, p. 34). Ramscar et al. (2014, 2017) showed that the patterns of response change in lexical decision tasks—typically taken as evidence for (and measures of) cognitive decline—emerge inevitably as more knowledge is acquired. In Ramscar et al.'s computer simulations, performance declined despite the learning capacities remaining constant, with cumulative experience making word-pairings ever harder to learn (Ramscar et al., 2017).

Brändle’s portrayal of older students’ apprehension is balanced by reports of many older students returning to learning with very high motivation (Edlinger, 2016; Matsumoto, 2019). A common perception of older learners is that language learning is an “anti-ageing activity” (Ryan & Dörnyei, 2013, p. 93). Challenging mental activities are indeed evidenced as helping older people maintain their cognitive functions and reducing the incidence of negative psychological states (cf. Lövden et al., 2013). Some research suggests that L2 learning delays age-related cognitive decline and fosters brain plasticity (Bak et al., 2014; Bialystok & Craik, 2010), as well as improving memory (Lapkin, Swain, & Shapson, 1990).

Bialystok et al. (2012) claim that bilingualism contributes to the maintenance of cognitive functioning and postpones the onset of symptoms in sufferers from dementia. The issue of a neurocognitive bilingual advantage is, though, highly controversial (see Pfenninger & Singleton, 2019a). Effects observed in bilingual conditions may in fact result from increased social participation, which can also be facilitated through other activities (see García-Pentón et al., 2016). Additional language learning in senior adulthood can be a means of promoting social interaction and integration, through which bilingual cognitive effects may be attained.

Data Elicitation

An important lesson that we can learn from the above is that in order to faithfully capture the construct, age requires operationalization and analysis as a continuous subject factor—an approach that is not often taken. For instance, Bylund et al. (2020), who put the hypothesis to test that bilingualism, rather than brain maturation, might be the best candidate for explaining any subtle differences between native and near-native ultimate attainment. Based on a 2 × 2 factorial design (with age of onset at birth/after birth vs. monolingualism/bilingualism) and a relatively small sample size (20 participants per group), they concluded that “while bilingualism may have a certain effect on some linguistic domains (e.g., lexis), age of onset exerted more consistent effects across the board”. In their analyses, the authors chose to assume linearity of L2 processes and to treat age of onset and bilingualism as categorical fixed effects (e.g., acquisition from birth, i.e., L1 vs. additional language acquisition, i.e., L2) partly because the AO range was too narrow and only covered early childhood—“a period during which pronounced differences in AoA effects are typically not attested” (p. 6), as the authors admitted. However, as with any other continuous variable, participant assignment to age categories may mask intra-group variability and result in loss of statistical power (e.g., Altman, 1998). Moreover, smoothing over variability by using general linear models such as ANOVA—the SLA default (Plonsky, 2014)—obliterates the very information needed to illuminate L2 development (Larsen-Freeman, 2006; Pfenninger & Singleton, 2017) and may deliver age effects which are illusory (see Pfenninger & Neuser, 2019). Cunnings and colleagues (e.g., Cunnings, 2012; Cunnings & Finlayson, 2015; Linck & Cunnings, 2015) have discussed in detail how mul-
Multilevel modeling—a subgroup of linear mixed-effects regression models—can offer a fruitful way of examining how individual differences, in general, may affect L2 acquisition. Multilevel models accommodate the intra- and inter-individual correlation and the variation discussed above, and thus help to protect the validity of statistical conclusions drawn from our analyses. We would argue that age research can be greatly enhanced by such an approach. Since these models can be used for assessing the impact of context-varying factors on individual difference variables, we are able to address external factors and environmental influences that interact with age effects and possibly mediate them. In a statistical analysis of such data, AO, biological age, and/or time are modeled as fixed effects (it being assumed that these effects DO NOT vary randomly within the population at hand), while random variation in the sample is modeled using random effects (e.g., subject-specific and task-specific differences), which take account of the fact that every participant in the study has slightly different characteristics. This is an idiosyncratic factor that affects all responses from the same subject, thus rendering these different responses inter-dependent rather than independent.

We believe too that an adequate understanding of the age factor must include a close and a nuanced look not only at younger learners but also at older adult learners. We are referring to the work that began some years ago into L2 learning by active senior adults. In Singleton and Pfenninger (2018), we argue that although much ground has now been covered by such research, there is a great need to investigate further dimensions of such third-age L2 learning—in particular, what learners bring to the process in terms of their individual attributes. Our consideration of the third-age L2 learning process should also take into consideration previous L2 learning experience: motivational curves, expectancy of success, goal relevance, volition, and agency as they affect motivation to learn and to re-learn languages, self-assessment of L2 skills’ and learning strategies’ change over the lifespan and their effect on ability to acquire new knowledge, such as a new language (Kliesch et al., 2018; Kliesch & Pfenninger, 2021). There is particularly great inter-variability and heterogeneity among older adults, which makes statistical generalizations across subjects almost impossible, and L2 learning is a complex, non-linear process, so that snapshots of states will not tell the full story of the process of adult L2 learning.

Studies on the age factor may have reached a crossroads. In all of the phases up to the present, the focus has been on identifying and exploring the importance of AO compared to other individual differences in their relationship to L2 attainment at a given point. Also, we have failed to attend to the social process of aging, relying rather on the popular portrayal of aging as decay and forgetfulness or on “common-sense” assumptions about age (e.g., “earlier = better”). Researchers as well as lay people thus crystallize the concept of age in a discourse of “age as internal causal factor”, in a manner which largely disregards current conceptualizations of age in social theory (see Rughiniş & Humă, 2015).

Researchers are finally beginning to 1) direct their attention to individuals’ actual developmental process by tracing different sub-components of the system and plotting their behavior and interactions, 2) examine the way different individuals are differentially affected by AO, and 3) seek holistic accounts of maturational effects and general age effects. Some have long questioned treating learner IDs as modular, stable, and context-independent traits (see Serafini, 2017), arguing for consideration of the multiple ways IDs and their sub-components dynamically interact with one another and with the external environment (e.g., Dörnyei, 2010). This view aligns with the more holistic approach adopted by a growing number of L2 researchers that sees language learning and language learners as dynamic, complex, adaptive systems within which all factors affect one another (Douglas Fir Group, 2016). Pfenninger (2020, in press), for instance, showed that, like other ID variables, the age factor is a dynamic entity that changes over time and affects L2 literacy development differentially at different times. Furthermore, none of the 91 participants in the eight-year longitudinal micro-development design in question showed the mean pattern of the group. Thus, the findings of a snapshot analysis of age effects may not be representative for a longer period of time and may not predict much about any individual’s behavior at any point in time.
perspectives (Ortega & Han, 2017) on third-age learning are also appealing if we want to make a distinction between chronological age and social or “contextual” age; the former is understood to be a “predictable, even ineluctable progression along an incremental scale”, while the latter is “a far less predictable ebbing and flowing, reflecting the arrival and passing of particular somatic, experiential and emotional circumstances” (Coupland et al., 1991, p. 140).

Practical Applications

The obvious area of application for the above findings is in the area of education. With regard to the education of children and adolescents, as we have seen the “earlier the better” assumption was the basis of a movement to lower the starting age of the introduction of L2s into schools, and this movement has been spreading and accelerating over the past few years. This is despite overwhelming, decades-old evidence that adding in an L2 as a further school subject in an ordinary primary school does not yield linguistic advantages and the fact that such evidence is accepted even by supporters of the CPH. We have also seen that the evidence in relation to immersion is mixed. Some recent research has entered a question-mark over earlier research showing later immersion to be as effective as earlier immersion. In any case, we know that immersion at any age is effective in equipping learners to communicate in the target language.

With this in mind, our recommendation is not that all primary school teaching of L2s should end. In any case, given the investment that has gone into early L2 education and the infrastructure that has been put in place to service it, such a recommendation would universally fall on deaf ears. Instead, we recommend a change in the direction of primary school L2 education in a more immersive direction. One possibility is to encourage CLIL, that is, providing the teaching of some school subjects via the L2, thereby increasing L2 exposure without consuming more time. Assessment of CLIL programs is rendered problematic by their diversity, but the signs in some cases are promising. Another measure that is worth considering is the engagement of parents in the primary school L2 enterprise, as parental encouragement seems to have a positive effect in relation to language learning—as it does in other areas of the curriculum.

Turning now to language learning in senior adulthood, the cliché that this is substantially hampered by sensory decline, memory disimprovement, and self-generated agism turns out to be overdone. Yes, there is sensory decline, but it can be compensated for. Yes, there may be problems with memory, but these may relate simply to the amount of material the older person has stored in memory over his/her life. Yes, there is sometimes fear of failure, but there is often determination and sheer joy. In light of this, the implication is that senior adults can learn L2s and that we as a society should continue to provide L2 learning opportunities for third-agers. Indeed, in an increasingly aging world, there is not the slightest likelihood of our being permitted to do otherwise.

Future Directions

The extreme version of the notion that the influence of age on language acquisition is a single factor is the classic version of the maturational perspective, which began by claiming that some physiological development was responsible for ending language readiness. Identifying the physiological development in question is a challenge, as is identifying the critical age. Puberty, the most popular candidate, turns out to be associated with quite a wide age range. The latest criterion for falsifying the CPH, “scrutinized nativelikeness”, seems impossible to meet because of the nature of multicompetence. Perhaps it is time for SLA age research to focus on matters other than the CPH question. The one domain where CPH falsification seems to have happened is in relation to L2s taught at school. Given the evidence that an early school start to L2 learning does not confer the imagined linguistic advantage, research efforts should probably focus on making the best possible other uses of the primary school L2 experience (cf. Pfenninger & Singleton, 2021).
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Note

1 According to Birdsong (2018), maturational effects are often thought of as taking place within, but not beyond, the “critical period”. For this reason, a distinction is sometimes drawn between maturational effects and general age effects over the lifespan, and a similar distinction may be drawn between maturational effects and AO effects.

References


Birdsong, D. (2014). The critical period hypothesis for second language acquisition: Tailoring the coat of many colors. In M. Pawlak & L. Aronin (Eds.), Essential topics in applied linguistics and multilingualism (pp. 43–50). Heidelberg: Springer.


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