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Language aptitude: Desirable trait or acquirable attribute?

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Abstract

The traditional definition of language aptitude sees it as "an individual's initial state of readiness and capacity for learning a foreign language, and probable facility in doing so given the presence of motivation and opportunity" (Carroll, 1981, p. 86). This conception portrays language aptitude as a trait, in the sense of exhibiting stability over long periods of time and being immune to training. The trait view of language aptitude tends towards the notion that it is innate, and indeed language aptitude has often been associated with the popular notion of a "gift for languages" (cf. Rosenthal, 1996, p. 59). The view of language aptitude as an innate trait has, however, long been questioned (see e.g., Neufeld, 1978). Recently, this questioning has intensified (see Singleton, 2014), especially since the development of a widespread consensus that working memory needs to be recognized as an important component of language aptitude (see Wen, 2016). Working memory was also once thought of as a trait, but is now recognized as susceptible to the influence of experience and instruction (see e.g., Williams, 2012). The present paper will track the trajectory of the above theoretical discussion and will explore the implications of the stage it has now reached.

Keywords: aptitude; working memory; experience; language aptitude tests; instruction

1. Introduction

The most widespread traditional definition of language aptitude sees it as "an individual's initial state of readiness and capacity for learning a foreign language, and probable facility in doing so given the presence of motivation and opportunity" (Carroll, 1981, p. 86). This conception portrays language aptitude as a trait, in the sense of exhibiting stability over long periods of time and being immune or very resistant to training. The trait view of language aptitude tends towards the notion that it is innate. Indeed, language aptitude has often been associated with the popular notion of a "gift for languages" (cf. Rosenthal, 1996, p. 59). Such a view may be at the very least over-simplistic. There are indications that language aptitude is in a number of its dimensions and to some degree a consequence of language experience and awareness (see Singleton, 2014). This paper will suggest that our approach to language aptitude needs to make room for acceptance of the proposition that language aptitude is not as "given" as we may have once thought, and that what happens to us *post*-natally may influence it very considerably. In regard to aptitudes in other areas too, it is acknowledged that, whatever may be innate, experience and practice are indispensable to bring this to manifestation (see e.g., Vinkhuysen, van der Sluis, Posthum, & Boomsma, 2009).

2. Language aptitude: Definition in terms of its measurement

Language aptitude has for decades been widely defined de facto in terms of the instruments deployed in researching it. In much recent aptitude research (see e.g., Muñoz, 2014) these instruments have tended simply to make use of (often just parts of) Carroll's Modern Language Aptitude Tests (MLAT)—which date back more than half a century (e.g. Carroll, 1973; Carroll & Sapon, 1959). The four components of language aptitude that are probed by the MLAT approach, and which in this connection and for these purposes define language aptitude, are summarized below:

> . . . phonemic coding ability, the capacity to code sounds so that they can be retained for more than a few seconds; grammatical sensitivity, the capacity to identify the functions that words fulfil in sentences; inductive language learning ability, the capacity to take a corpus of material in a target language and make extrapolations (i.e., generalisations) from that material; and associative memory, a capacity to form links between native and foreign language words. (Skehan, 2001, para. 2)

An increasingly popular alternative to utilizing the MLAT instrument is to deploy Meara's quite recently developed LLAMA suite of tests (Meara, 2005; see also Granena, 2013). The LLAMA tests build "on pioneering work by John

Carroll (e.g., Carroll & Sapon, 1959) but over years . . . the design of the tests has significantly diverged from the originals on which they were based" (Meara, 2005, p. 2). One is entitled to pose the question, however, whether this really constitutes an alternative, given that the LLAMA set of tests is, as Meara himself reports, largely modelled on the MLAT tests, and their design differences largely amount merely to "a more snazzy presentation style" (Lognostics, 2016). Moreover, the tests in question, says Meara, "have not been extensively standardised, and should *not* be considered a replacement for MLAT in high-stakes situations" (Lognostics, 2016). In fact, the LLAMA tests have been deployed frequently in quite a cavalier way, and the manner in which they are being used, contrary to Meara's advice, in a great deal of current frontline research is apparently causing their creator considerable heartache, not to say sleepless nights (Vivienne Rogers, personal communication, 2016). For example, they have been used in important age-related research investigating whether language aptitude acts as a prophylactic against the effects of the so-called "sensitive" or "critical" period (see e.g., Abrahamsson & Hyltenstam, 2008; Granena & Long, 2013).

The Modern Language Aptitude Tests (and their LLAMA derivatives) have thus been widely used for decades, and essentially are still being used; some would no doubt argue that this demonstrates the proof of their worth. It is worth pointing out, however, that they fall within the ambit of Stansfield's swingeing critique of standard language aptitude tests which he made in 1989 (Stansfield, 1989, pp. 3-4; cf. Parry & Stansfield, 1990; Skehan, 2002), and which, in many people's view, has never been satisfactorily answered. There are, of course, other language aptitude tests in use, for example, the Pimsleur Language Aptitude Battery, the High Level Language Aptitude Battery (Hi-LAB), and the Cognitive Ability for Novelty in Acquisition of Language – Foreign Test (CANAL-F), for which the researchers below are respectively responsible. These overlap, however, with the MLAT tests (e.g., Pimsleur, 1966), their validation is still in progress (Doughty et al., 2010) and/or their track record is no better than that of the MLAT tests (e.g., Grigorenko, Sternberg, & Ehrman, 2000), which is no doubt why researchers keep going back to the latter. We now turn our attention more broadly to the nature and scope of language aptitude.

3. The mutability of language aptitude

As was stated in the introductory section, contrary to the traditional view of language aptitude, there are increasingly indications and claims that such aptitude is not an unalterable endowment present from birth—or not *just* something which is innate and unalterable—and that, at least to an extent, the awareness that derives from experience and training impacts on it (cf. Robinson, 2002). In Wen's (2012) words,

> the concept of FLA has developed considerably over the last 15 years, from being seen as a stable and unitary fixed trait to being considered as more dynamic and multiple sets of malleable abilities that interact with other internal "learner attributes and attitudes" (Larsen-Freeman, 2001). (p. 234)

Of course, the trait conception of language aptitude did not arise from nowhere. Some early studies (e.g., Skehan, 1986; cf. Sparks, 2012) showed a correlation between early L1 development performance in children and their later L2 aptitude scores and L2 proficiency, which was taken as a demonstration of aptitude constancy from early childhood.

The current line of thinking, however, is that stability of aptitude based on some kind of bio-endowment is far from the whole story. This is not a new view. Neufeld (1978) had something similar to say on the matter nearly 40 years ago. He suggested that the ability to shine in a second language is not dependent on what one is equipped with innately, but rather upon one's previous learning experiences. Larsen-Freeman and Long (1991, p. 169) also interpreted doing well in language aptitude tests as having its source in what emerges from the pattern of classroom experience rather than "some innate linguistic ability."

Van Lier (1996), for his part, consistently saw the development of language awareness, which is usually seen as distinct from language aptitude, as closely linked to it, as making a crucial contribution to the ability to learn language. His perspective on the matter was that "to learn something new one must first notice it . . . pointing one's perceptional powers in the right direction and making 'mental energy' available for processing" (p. 12). Schmidt (2012), like Van Lier, talks about the importance of "noticing." Since noticing involves awareness, and since Schmidt regards noticing as playing a very important part in learning, he also makes the connection by implication between coming to awareness and the development of aptitude to learn. Attention and noticing are crucial concepts for understanding second and foreign language learning. As Baars (1997) puts it, "Paying attention – becoming conscious of some material – seems to be the sovereign remedy for learning anything . . ." (p. 44).

Jessner (2006, 2014) has approached the awareness-aptitude nexus in the context of a discussion of the benefits claimed for multilingualism (cf. de Bot, 2015; De Bruin, Treccani, & Della Sala, 2014). She reports from her findings a metalinguistic awareness in her subjects that she claims to be one of the fruits of the experience of multilinguality. She goes on to say that this metalinguistic awareness appears to be very much associated with the development of certain cognitive advantages, in other words with the development of particular kinds of aptitude. As she herself puts it, "the cognitive advantages which have been seen to develop in multilinguals have been related to an enhanced level of metalinguistic awareness" (Jessner, 2006, p. 65).

Kormos (2013) sums up the way in which thinking on this matter is moving with admirable succinctness:

> Although language-learning aptitude might seem to be a relatively stable individual characteristic when compared with other factors, such as motivational orientation and action control mechanisms, there seems to be some converging evidence that certain components of aptitude . . . might improve in the course of language learning. (pp. 145-146)

She cites in this connection a number of studies:

> Eisenstein (1980), who showed that bilinguals and students with foreign language training evinced higher levels of language aptitude than individuals without such experience; Sparks et al. (1995), who reported that instruction in Latin resulted in increased language aptitude scores in high-school students; Sáfár & Kormos (2008), who compared two groups (at the beginning and end of the academic year) undergoing different amounts of EFL instruction; the change in language aptitude scores was significantly higher among those receiving intense instruction; Nijakowska (2010), who found indications that phonological sensitivity can be developed with the aid of specialized teaching. (p. 145)

4. The working memory dimension

A particular instance of the notion that language aptitude develops with experience relates to the case of working memory (cf. Chan, Skehan & Gong, 2011; Wen, Biedroń, & Skehan, 2017). There are some differences between current models of working memory, but they have commonalities in regard to the conceptualization of this construct and to the account given of its processes. These models share a view of working memory as "mechanisms and processes that are involved in the control, regulation, and active maintenance of task-relevant information in the service of complex cognition" (Miyake & Shah, 1999, p. 450). They also share a conception of working memory as a limited capacity construct, whose efficiency may vary widely from individual to individual. Working memory is generally assumed to comprise multiple components, each of which is seen as accounting for certain domain-specific effects. For example, a component that has been identified as especially relevant in the context of second language lexical learning is phonological short-term memory (also referred to as the phonological loop), which is believed to be responsible for the manipulation and retention of verbal material. Within the most widely researched working memory model, the so-called multi-component working memory model (Baddeley, 2000, 2007; Baddeley & Hitch, 1974), phonological short-term memory is conceived as a subsidiary system alongside two other subsidiary systems (the visuospatial sketchpad and the

later incorporated episodic buffer), and one supervisory attentional system (the central executive) (Skrzypek & Singleton, 2013).

Working memory capacity has been shown to have an impressive impact on second language learning (and, let it be said, on first language learning). There is no suggestion, of course, that working memory capacity explains everything (cf. Baddeley, 2003), but Wen (2016) cites a large number of empirical studies which indicate a close and positive relationship between the phonological aspects of working memory and attainment in second language lexical acquisition (e.g., Cheung, 1996; Ellis & Sinclair, 1996; French, 2006; Service, 1992), as well as the acquisition of L2 formulaic sequences and collocations (e.g., Bolibaugh & Foster, 2013; Foster, Bolibaugh & Kotula, 2014; Skrzypek, 2009) and grammar acquisition and development (e.g., French & O'Brien, 2008; Martin & Ellis, 2012; O'Brien, Segalowitz, Collentine, & Freed, 2006, 2007; Verhagen & Leseman, 2016; Williams & Lovatt, 2003). Accordingly, a strong connection has been established between phonological working memory capacity and the degree of proficiency achieved in relation to lexis, formulaic sequences and morpho-syntactic constructions (Ellis, 1996, 2012, 2013; Martin & Ellis, 2012). The scope of working memory certainly extends far beyond the language learning area. Nevertheless, it is clear that a high working memory capacity needs to be brought into the picture when consideration is being given to elements which may contribute to an aptitude for learning languages (R. Ellis & Shintani, 2013; Wen & Skehan, 2011; Wen, Biedroń & Skehan, 2017), even if the question of the unidirectionality or bidirectionality of the influence requires further research and consideration.

As Mitchell, Myles and Marsden (2013, p. 155) point out, working memory, in common with language aptitude, "has traditionally been thought of as a 'trait' – a relatively fixed capacity that increases in a predictable, maturationally constrained way as children grow." Given the robust evidence that higher working memory capacity is associated with higher language learning performance, this "trait" view of working memory seems to point to the integration of higher capacity in this area with the trait understanding of language aptitude. In recent years, however, the view has been formed that working memory is, in fact, amenable to modification through relevant experience and training (Eysenck, 2012; Holmes, Gathercole, & Dunning, 2009; Klingberg, 2010). Also relevant may be the claim that bi-/multilingualism induces a higher degree of cognitive flexibility. For example, Adi-Japha, Berberich-Artzi, and Libnawi (2010) report findings on the drawings of bilingual children, which they say provides support for the suggestion that "flexibility in the linguistic domain may facilitate flexibility in other nonlinguistic domains demonstrating the effects of experience (and in particular bilingualism) on children's development" (p. 1364). Since drawing is a complex skill involving fine-motor, perceptual, cognitive, and

other developmental competencies, working memory would seem to be inevitably involved in the mix.

This change of view has very much impinged on the way working memory is now perceived within second language acquisition research (see e.g., Williams, 2012). Morales, Calvo and Bialystok (2013) found that children with experience of bilingualism performed better than monolingual children on working memory tasks. In their investigation two studies were carried out involving monolingual and bilingual children, the first manipulating working memory demands with reference to conflict resolution, the second based on a visuospatial span task manipulating other executive function component. The bilinguals outperformed the monolinguals in both kinds of tasks. Indeed, the more complex the tasks the larger the difference between bilinguals and monolinguals. The authors interpret these results as demonstrating a working memory advantage for bilinguals (see also Blom et al., 2014). It has to be said that these findings are somewhat in contrast to those of Engel de Abreu (2011), who found that dealing with a multiplicity of language systems in the mind had little impact on working memory. Another study (Gass & Lee, 2011) reveals that two different second language groups at different stages in their university second language study (first and third year respectively) evinced significantly different second language working memory scores, which, again, points to a shaping, changing role for experience in relation to working memory capacity. In an earlier L2 study MacDonald and Christiansen (2002) illustrated a clear correlation between working memory capacity, practice and experience.

What might be the implications of the above in educational terms? It is notable that there has been a considerable amount of work done by Gathercole and her colleagues in assessing working memory and in attempting to train its capacity among children whose general academic performance has been adversely affected by their poor working memory. What emerges from such work is a claim that working memory can be improved by a process of training in such a way that it contributes to helping the children's learning (Dehn, 2008; Dehn, Kaufman, & Kaufman, 2015; Gathercole & Alloway, 2008; Klingberg, 2010). It has been mooted whether it might be possible to modify second language classroom instruction so that it fits second language learners' working memory profiles (Skehan, 2012; cf. DeKeyser 2012), but, in addition, in the light of the above findings, more radically, it has been suggested that it may be possible to come up with pedagogical measures which may improve second language learners' working memory capacity. Tsai, Au, and Jaeggi (2016) have reviewed a set of studies reporting working memory training in relation to second language learning, which appear to have had a successful impact in respect of raising the level of capacity of executive components of working memory. Working memory training research (see

also Au et al., 2015) is controversial (cf. Melby-Lervåg & Hulme, 2013), but accounts of its positive effects are vigorously defended (see Au et al., in press), and such accounts are in line with the general evidence of the malleability of working memory capacity (see Gathercole's work and the studies referred to in the last paragraph). It is worth noting in this connection that in older adult learners substantial memory improvements (in which, of course, working memory plays a part) have been effected by memory strategy training (Grotek, 2002).

Undoubtedly, more research is needed to evaluate how far the malleability of working memory should be taken into consideration by second language didactics and to what extent research findings in this area can inform second language pedagogy (cf. Doughty et al., 2010). Citing Bunting and Engle (2015) and Williams (2015), Wen (2016, p. 153) points out that the investigation of working memory in relation to second language learning is in general "still in its infancy" and that the interaction postulated between working memory and particular second language domains and processes is "only speculative" and requires "further scrutiny." Specific areas recommended by Wen (2016, pp. 153-154) for future research in this context are the relative importance of working memory vis-à-vis "statistical" mechanisms (cf. Miysak, Christiansen, & Tomblin, 2010), the impact on the working memory construct of complex, dynamic conceptions of language (cf. de Bot, 2008) and the connection between working memory and socio-affective factors (cf. Dörnyei, 2010).

What this section has attempted to show is that there has been a similar evolution in the conception of working memory to the evolution of the notion of language aptitude. We saw earlier that language aptitude has developed from being seen as a more or less unalterable bio-endowment, a "gift for languages," that is present or not from the cradle onwards, to being recognized as a phenomenon which is changeable by experience. In like fashion, in the present section we have noted that working memory capacity has gone from being regarded as a fixed, lifelong given to being viewed of as improvable with increasing interaction with language(s) and possibly formal training. The interesting aspect of these developments is that they have more or less coincided with a process whereby working memory has been progressively acknowledged as a vital dimension of language aptitude.

5. Concluding remarks

All in all, the language aptitude discussion clearly requires a great deal more research and reflection at a definitional and theoretical level, and also in respect of its practical implications. Fortunately, it is clear that such research and reflection are now coming its way. The fact that the bibliography to the present article contains numerous recent and forthcoming works dealing with language aptitude

is proof positive that there is renewed interest in this area, which not so long ago was something of a neglected backwater of applied linguistics. What is more, this interest is patently focused on the kinds of issues that most urgently require research attention. That is to say, the emphasis is not only on producing more *reliable* tests, although endeavours to this end are certainly ongoing. Also under way is a thorough examination of the *validity* of language aptitude testing via an exploration of the entire construct of language aptitude, including its extent, its components, and its status as trait or attribute. Perhaps the most significant indication of this root-and-branch re-appraisal of the nature of the construct of language aptitude has been the recent proposal to include working memory capacity as, among many other things (!), an important part of what we consider language aptitude to be.

The particular issue that has been raised here regarding the extent to which language aptitude is innate and stable and to what degree influenceable by experience, seems increasingly, in the light of a range of language aptitude research, and in the light of recent research on working memory, to be receiving an answer which favours the notion of at least its post-natal improvability. The question also arises as to whether language aptitude and language experience/awareness are actually separable as constructs or whether they co-subsist on the same continuum (see Singleton, 2014). Evidence I have cited in this connection has its origins in classroom research, language awareness research and multilingualism research. On the basis of the above-mentioned proposed inclusion of working memory capacity within the language aptitude construct, such cited evidence also draws on recent research concerned with working memory. In particular, in regard to the second language learning situation, it refers to a range of indications that increased second language experience is associated with increased working memory capacity and a forthcoming study which seems to show that working memory training in the context of second language learning was successful in raising working memory capacity. If this latter finding is replicated, it may point the way to the development of some pedagogical ways of operating which might have a tangible impact on improvement of language aptitude via the improvement of working memory capacity.

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