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Second Language Acquisition and Autism

B.A. Essay

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Abstract

Current research on language development and bilingual development suggests that good proficiency in the first language (L1) is a prerequisite for acquiring a second language (L2). Documentation from the Icelandic State's Diagnostic and Counselling Centre seems to challenge this assumption, as a number of children who have been diagnosed with Autism Spectrum Disorders (ASD), and that have delayed or impaired L1 development, seems to have very good proficiency in English, which is their L2. This study examined the data available for three ASD teenagers that fit in this group. The subjects have a history of delayed or impaired L1 acquisition and their L2 proficiency was determined to be significantly better than their typical development (TD) peers. These findings call for further study using more rigorous tests and evaluation measures with a larger number of participants. The findings of this study either challenge contemporary language acquisition theories or call into question the assumption that ASD children have delayed L1 development; or thirdly that only the L1 production facility (the L2 language production) in the brain might be affected by the disorder and not the area in the brain that is thought to be common to both L1 and L2 which processes language reception.

Table of Contents

1.0 Introduction

Language development is a process that begins at birth. At first the child learns language by internalisation, i.e. by applying sounds to images. The child transitions from internalisation to interpretation when they start realising the syntax of the language. At the end of the first 48 months the child will have acquired the basic skills in language use and a vocabulary mostly limited to their experience (Hirsh-Pasek & Golinkoff, 1996; Foudon, Reboul, & Manificat, 2008). In the years to follow, the child expands on this fundamental knowledge of language structure by increasing their lexicon, and applying ever more complex sentence structuring in their utterances. Language is the essential tool for relaying social and cultural rules, history and behaviour between generations. It is therefore crucial for the child's social adaptation that they are given opportunity to participate in social conversation with parents and other caretakers (Hamers & Blanc, 2000).

Research on the acquisition of a second language (L2) while the child maintains their first language (L1), has produced strong evidence that the child benefits from bilingual development. A bilingual child has larger control task capacity and benefits therefore substantially in comparison with typical development (TD) monolinguals. Studies have shown faster cognitive development and higher cognitive achievements, as well as less age related memory loss in the elderly (Bialystok, Craik, Klein, & Viswanathan, 2004; Bialystok, 2011; Bialystok & Barac, 2012; Poulin-Dubois, Blay, Coutya, & Bialystok, 2011).

There has been a continuous debate for several decades on whether there is a limited period during childhood when a person can achieve bilingual proficiency. Evidence suggests that there is a period until puberty when children are best equipped to master L2. Acquisition of L2 is not impossible beyond puberty but it is very unlikely that a person will acquire native-like proficiency in L2 after puberty. In addition, the child must have native-like proficiency in L1 in order to develop L2 properly (Birdsong, 2006; Hamers & Blanc, 2000; Lenneberg, 1967; Oyama, 1979).

A physical difference in the brain of compound bilinguals, who are those who learn L1 and L2 simultaneously, and consecutive bilinguals, who are exposed to L2 after a few years of L1 acquisition, has somewhat been revealed by contemporary brain scanning techniques. The reception and low-level processing of both languages is observed in the same area of the brain (Wernicke's area). This applies to both compound and consecutive

bilinguals. High-level processing and production of both languages take place in a different part of the brain (Broca's area). There is however strong evidence for the L2 in compound bilinguals to be processed and produced in a slightly different area of the Broca's area than L1 (Golestani, Alario, Meriaux, Bihan, Dehaene, & Pallier, 2005; Halsband, 2006; Kovelman, Baker, & Petitto, 2008; Kroll, Bobb, Misra, & Guo, 2008; Marian, Spivey, & Hirsch, 2003).

People diagnosed with Autistic Spectrum Disorders (ASD) often lack the communicative skills acquired by their TD peers. The reason for this deficiency is discussed in a landmark article: *Does the autistic child have a 'theory of mind'?* (Baron-Cohen, Leslie, & Frith, 1985). The theory explains how neurologically diminished social capacity inhibits language development of the autistic child, by depriving them of proper social interaction and thus social interpretation. This has, to a varying degree, a significant effect on the key language domains of discourse, pragmatic functions and syntax. Autistic people therefore often have limited vocabulary and syntax; their speech may have strange intonation or pitch; and they may have limited or no notion of how to conduct a conversation. Both the American Psychiatric Association and the World Health Organization have recognised this common language deficiency in their diagnostic manuals (American Psychiatric Association, 1994; Eigsti, de Marchena, Schuh, & Kelley, 2011; Frith & Happé, 1994; World Health Organization, 1992).

Psychiatrists consider Asperger's syndrome (AS) as mild ASD. Children with AS do not experience language delay. AS children usually pick up language fast and are often especially noted for their advanced speech pattern and large adult-like lexicon. Recent evidence suggests that AS children have a language acquisition impairment that is due to the social interaction skills deficiency the children show (American Psychiatric Association, 1994; Foudon et al., 2008; Frith & Happé, 1994; Koning & Magill-Evans, 2001; Leekam, Libby, Wing, Gould, & Gillberg, 2000; Saalasti et al., 2008; Wire, 2005; Woodbury-Smith & Volkmar, 2009; World Health Organization, 1992).

The Icelandic State's Diagnostic and Counselling Centre has for many years noted ASD children who have diminished proficiency in Icelandic as their L1, but are seemingly fluent in English (L2), without any obvious explanation. (L. I. Gunnarsdóttir, personal communication, January 20, 2012). This intrigued me as a former bilingual teacher as this discovery seems to challenge accepted views in bilingual studies that proficiency in L2 depends on a high level of proficiency in L1. I conducted a small study, appropriate to

requirements stipulated by a BA thesis, to shed light on this language development and try to determine its reasons.

The study included three 16-18 year-old males who were afflicted with ASD, and had no special background in English nor a connection to an English-speaking community. I interviewed them and their supervisor. I also reviewed relevant academic work. The data collected was analysed with regard to their (a) personal information, (b) language acquisition history, and (c) Icelandic and English proficiency. All subjects had a childhood history of delayed or impaired language development in their L1. Some had not reached TD proficiency in their L1 at the time of the study. All subjects had demonstrated, according to their teachers, advanced proficiency in English, and more advanced than can be expected of their TD peers. Therefore the research question is:

> Can Icelandic ASD children, with history of delayed and impaired first language acquisition, acquire English as a second language despite first language acquisition difficulties and apparently no more English exposure than TD children? If so, what are the possible explanations for this non-typical language development?

This thesis is organised as follows: In chapter 2 I give an overview of general language development in children, and discuss theories and research about bilingual language development. This discussion is followed by an overview of the nature of autism and how it manifests itself in impaired language development, with special attention to the language acquisition of AS children. At the end of the chapter, basis for the research question is formulated, using the literature already reviewed. Chapter 3 covers the study itself. The research question is formulated, and the participants, methods of data collection, and the method of analysis are explained. Chapter 4 contains the results of the study where each subject is analysed in their own subchapter. In Chapter 5, I discuss the results obtained in the study, how they support the research question, and give an overview of possible reasons for the answers obtained. In Chapter 6, I conclude the essay with the potential impact the results from this study might have on the bilingual acquisition theories and autistic development research.

2.0 Literature Review

2.1 Language Development

Language development is a very complex process affected by many factors in various ways. This is true, even for language acquisition unimpeded by any physical or mental constraints. Physical and psychological ailments can delay language acquisition or hinder it altogether. Environmental circumstance can also cause delays such as when input is limited as in the well-known cases of feral children or parental neglect, and in some cases leading to complete absence of language (McCrone, 2003; Sylvestre & Mérette, 2010). In contrast, proper parental engagement, such as reading to children and other verbal interventions, may speed up the child's expressive and receptive language (Karass & Braungart-Rieker, 2005; Sheridan, Knoche, Kupzyk, Edwards, & Marvin, 2011).

Even though the infant's first communication with its caretaker is nonverbal, development processes in the brain have already started to learn how to understand and talk to the humans around them. Hirsh-Pasek and Golinkoff (1996) describe a three-phase model of language comprehension and production of infants from 0-48 months (Table 1).

Phases	Dominant process	Form of representation	Language comprehension	Language Production
Phase 1 0-9 months	Internalization	Acoustic correlates of linguistic structure / Images-schemas (not propositional)	Some words	Few, if any words
Phase 2 9-24 months	Internalization and interpretation	Words, some early grammar / Propositions, cuts becoming language dependent	Syntactic, when redundant cues from context, semantics and prosody coincide	Prototypical transitive and intransitive sentences, often incomplete
Phase 3 24-48 months	Interpretation	Hierarchical representation of linguistic structure / propositions, language dependent in nature	Syntactic, even when redundant cues fail to coincide, can compute interclausal relations	Complete sentences, variety of structures

Table 1 - Three-phase model by Hirsh-Pasek and Golinkoff (1996) as presented by Foudon, Reboul and Manificat (2008, p. 51)

During the first phase, internalisation is the dominant process. The infant is listening to the sounds and starts mapping them on visual functions. They might try out simple words (Foudon et al., 2008). At 6 months, infants can distinguish the vowel segments according to

the language structure they are immersed in, suggesting a mechanism for recognising intelligible speech either prenatally or during first days of life (Hamers & Blanc, 2000).

The second phase is a transitional phase where the child leaves the internalisation process in favour of the interpretation process. They know some words and have a very early notion of grammar, as propositions become language dependent and replace images. Syntax, semantics and prosody understanding is based on the cues happening simultaneously. Their utterances are limited to some prototypical transitive and intransitive sentences, but they are often incomplete (Foudon et al., 2008).

Finally, the child enters the third and last infantile phase where the interpretation process has replaced the internalisation process. The child learns that linguistic structures are hierarchical and that events can be represented without being present. The child understands all syntax and realises interclausal relations. Utterances consist of complete sentences, which they can manipulate, for example: *The man ate the pie; the pie was eaten by the man*. (Foudon et al., 2008).

The basic structure of language is therefore in place at or around 48 months. The child uses this acquired mechanism to enhance their grasp of language, largely in a social and cultural context. The language becomes more complex as the lexicon grows and the child uses the language as its main communicative channel with their parents and peers. The socialisation and acculturation of a child is mainly done through language. The child learns how to interact with their parents in order to get what they want. Parents relay proper knowledge and social conduct through language. Whenever a child uses the language progressively, they enhance their control over and expand their basic grasp of language structure (Hamers & Blanc, 2000).

2.2 Bilingual Language Development

A whole new dimension is added to this process when a child acquires two languages, either simultaneously or consecutively; the child becomes bilingual. In the early days of linguistics, bilingualism was considered to lead to developmental deficit. Smith (1933), who studied different varieties of English spoken by bilinguals in Hawaii, mistakenly thought that the variety spoken by her subjects was deficit English. It is well known that interference in language development may occur in bilinguals whose L1 development is discontinued. This may happen for example if the child moves out of the L1 community or a negative value becomes associated with their L1 to the extent that the child abandons the language. This process of language attrition during childhood has a negative impact on the child's

intellectual development, language competence and even personality (Bylund, 2009; Hamers & Blanc, 2000).

More recent researches have revealed that children benefit cognitively from being bilingual. Researches covering all age spans suggest that the unique strategies needed for mastering two languages enhance control of both verbal and nonverbal tasks. A person's executive control system is enhanced although how this occurs is not fully understood. Comparison between monolingual and bilingual groups of elderly subjects has shown less age-related loss of executive control and a delayed onset of dementia in bilinguals (Bialystok, Craik, Klein, & Viswanathan, 2004; Bialystok, 2011; Bialystok & Barac, 2012; Poulin-Dubois, Blay, Coutya, & Bialystok, 2011).

In an attempt to explain why children seem to have more facility than adults for acquiring native fluency in L2, Lenneberg (1967) introduced the *critical period hypothesis*. The original hypothesis assumes that the linguistic development of L1 and L2 must be triggered before puberty. The line the hypothesis draws at puberty has been criticised for decades for lack of empirical evidence. Some theorists have drawn the line at 6 years of age or gone to either extreme; dismissed the possibility altogether that native fluency is possible in an L2 (Bylund, 2009), or dismissed the view that there is any specific limit on age when it comes to L2 learning (Birdsong, 2006; Hamers & Blanc, 2000).

Strong evidence indicates that early L2 exposure leads to native-like control of it (Hamers & Blanc, 2000). A less rigid attempt at describing this phenomenon is Oyama's (1979) *sensitive period hypothesis*. The hypothesis suggests that the period before puberty should be considered a special period where the brain is more sensitive to a second linguistic environment. The hypothesis does not exclude L2 acquisition beyond puberty, although native processing will most likely not be achieved (Hamers & Blanc, 2000).

In recent years, new technology has made it possible for researchers to see to some extent how a person processes language. Positron Emission Tomography, better known as PET-scans, and functional Magnetic Resonance Imaging (fMRI) have allowed researchers to map active brain matter during language exercises. These studies have given researchers some evidence for how the brain processes languages. In general, both L1 and L2 are received and processed in a basic way in the same part of the brain commonly known as Wernicke's area. However, the two languages activate, to a certain extent at least, different areas of another part of the brain, the Broca's area, for high level processing and production of language. This is especially noticeable in consecutive and non-proficient bilinguals

(Golestani, Alario, Meriaux, Bihan, Dehaene, & Pallier, 2005; Halsband, 2006; Kovelman, Baker, & Petitto, 2008; Kroll, Bobb, Misra, & Guo, 2008; Marian, Spivey, & Hirsch, 2003).

Children raised as bilinguals, and unhampered by physical or mental constraints, learn the two languages in much the same way as monolingual children do. For some children language production may be slightly delayed however, because of the added complexity of learning two languages simultaneously. Their infant language development follows the same principles as described in Table 1, but the language production follows a different pace. A bilingual TD child will speak its first word roughly at the same time as monolinguals, but first word combinations emerge at around 24 months versus 17 months, respectively. After that, the bilingual children gradually decrease the gap and will outperform monolinguals in the years that follow, acquiring a permanent linguistic advantage over monolinguals. (De Houwer, 2009; Foudon et al., 2008; Poulin-Dubois et al., 2011).

In order for a person to acquire L2 successfully, the child must have experienced normal L1 development; first through internalisation and later through interpretation and ostensive behaviour. If a child loses their L1 or does not have a history of normal L1 acquisition, the mechanisms necessary for acquiring L2 do not exist and therefore hamper L2 development significantly. As said before, L1 attrition is likely to have a negative effect on subsequent language and cognitive development and even the personality of an individual. The successful development of both L1 and L2 is based on the development of a number of linguistic domains. Eigsti, de Marchena, Schuh, and Kelley (2011), and Hamers and Blanc (2000) have identified key language domains in which a deficiency in language development will emerge. The first element is discourse and pragmatic functions, or how people use language as a communication and social interaction tool. Examples of pragmatic functions are register, i.e. how one changes one's speech to facilitate the interlocutor; correct behaviour in turn-taking; and accommodation of speech to enhance mutual recognition in a conversation. Discourse is the continued and coherent stream of speech. Together, discourse and pragmatic functions are the language domains most important for social interaction. They are necessary for one to recognise and interact with an interlocutor based on social status, interest, knowledge and other qualities they may harbour. Having full control of this domain means the person has learned the discourse conventions of language and how it is used in a social context.

A second domain is prosody, which is closely related to pragmatic functions, and refers to how speech is manipulated by the speaker using intonation, stress and rhythm.

The third domain is the acquisition and use of syntax. The building of sentences can be considered as the most complex part of linguistics and syntax is therefore the key building block for appropriate language use.

The fourth domain is the study of morphemes, which are "the smallest meaningful units of language" (Eigsti et al., 2011, p. 686). To clarify further what a morpheme is, a short example is in order: *fishery, fished, fishing, fishy, fisher, codfish,* are words that all use the morpheme *fish* with different pre- and postfixes to change the morpheme's meaning.

Semantics, as a fifth domain, is also of interest. In addition to knowing how the language is structured (syntax), it is also imperative for a language user to know what words mean and how those meanings are applied to the real world. Acquisition of an extensive vocabulary will enhance the speaker's social competence.

The sixth domain is phonology. It overlaps with phonetics, the study of production and articulation, but focuses on how a speaker puts the sounds together to produce a meaningful language. These six language issues are given in this order by Eigsti et al. (2011) as key language domains on p. 683-687.

2.3 Autism and Language Development

Autism is a developmental disorder, affecting more than six children in a thousand, and second only in frequency to mental retardation (Newschaffer et al., 2007). It is a life-long biological disorder with a wide range of appearances. Autism can appear in a mild or severe form and with or without other handicaps or diminished mental capacity. As the autistic diagnosis includes individuals of very different aptitude in different criteria, autism is often referred to as Autism Spectrum Disorders (ASD), which will be the preferred terminology in this thesis (Frith & Happé, 1994).

Autistic people often have delayed and impaired language development, due to their neurological disorder. Early indication that a child may be afflicted by autism is a lack of age appropriate language development. Some children who are severely autistic never learn to speak. When autistic children start to speak, their speech is often severely limited in vocabulary and syntax, and has unnatural pitch and intonation. Their language development continues to be impaired, as they have very diminished socialisation capacity. Baron-Cohen, Leslie, and Frith (1985) developed the Theory of Mind (ToM) to explain how ASD children lack or have impaired language and social competence. They also use ToM to explain that language skills that do not focus on social interaction or social interpretation, especially reading and writing, are preserved. People with an impaired ToM can interact with other

people, but they will fail in deducing the correct state of mind of the interlocutor and therefore will not allow for any accommodation in their conversation.

The common trait of all ASDs is any type of handicap in social interactions, communication and imagination (interests and activities) (Frith & Happé, 1994). For the purpose of this thesis, we will focus on the communication drawbacks of ASD. The American Psychiatric Association (APA) and the World Health Organization (WHO) have each produced a diagnosis manual for physicians. Both describe very similar criteria when diagnosing ASD. In APA's *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association, 1994), the criteria are split in three major categories: social interactions, communication, and repetitive and stereotypic patterns.

In the communication category, at least one of the following impairment must be manifested:

(a) delay in, or total lack of, the development of spoken language (not accompanied by an attempt to compensate through alternative modes of communication such as gesture or mime)
(b) in individuals with adequate speech, marked impairment in the ability to initiate or sustain a conversation with others
(c) stereotyped and repetitive use of language or idiosyncratic language
(d) lack of varied, spontaneous make-believe play or social imitative play appropriate to developmental level

(American Psychiatric Association, 1994, p. 70)

In addition, the individual must before 36 months of age show delay in, or abnormal functions, in at minimum one of these three areas:

(1) social interaction
(2) language as used in social communication
(3) symbolic or imaginative play

(American Psychiatric Association, 1994, p. 71)

The diagnostic criteria suggest that the disorder affects either the internalisation part of the language acquisition process, or the transfer from internalisation to interpretation. All the items listed are symptoms of a deficit in The Theory of Mind. A ToM deficiency suggests that ASD children fail to transfer their language acquisition skills from internalisation to interpretation successfully.

Typically, ASD are split into low-functioning and high-functioning groups. Low-functioning individuals are very slow language learners and many of them never acquire a spoken language at all during their lifetime (Foudon et al., 2008). In those cases, they do not compensate with any sort of gestures or sign language so there is no intelligible form of communication. They are not necessarily silent; they may make sounds that do not form any part of speech or babbling attempt, but may still be recognised by the caretaker as indicators of a mood or a need. A caretaker of one ASD person will not be able to transfer their decoding to another ASD person's utterances (Frith & Happé, 1994).

High-functioning ASD children usually learn a language for communication although in majority of cases language acquisition is severely delayed. Their language acquisition is therefore different from typical development (TD) children. The average delay of ASD first word utterances compared with TD is a staggering 27 months (38 months vs. 11 months respectively). ASD first word combination is delayed on average by 35 months. The interval between the first word and first word combination is 8 months longer than with TD children. This difference continues into adulthood. High-functioning ASD people do not catch up with their TD peers in language proficiency (Foudon et al., 2008).

In a literature review of language acquisition in ASD, Eigsti et al. (2011) noted a number of domains of language where autistic people may differ from TD people. Failure to master the domain of discourse and pragmatic functions will result in awkward conversations where one might use overly formal words and sentences might sound weird or cut off. Also, an autistic person might fail to repair misunderstandings or confusions in conversations by not asking their interlocutor to clarify the utterance in question, resulting in a failed conversation.

Although few studies have been made on the prosody domain and autism, every single study has showed consistent prosody deficiency in autistic children. Their interlocutor may consider them loud and their lexical stress may be wrong (Eigsti et al., 2011).

Current research indicates that TD population controls more syntax and produces more complex language than ASD people do. This is however a complex issue and one study suggests that ASD can be split in two with regard to language: (a) ASD with specific language impairment (SLI) pertaining principally to grammar, and (b) ASD without SLI (Roberts, Rice, & Tager-Flusberg, 2004). Research results vary, and there is no consensus on whether, and if so to what extent syntax deficiency is applicable to ASD. Overall though, the majority of findings conclude that there is a significant delay in this language domain in children with ASD.

Semantics research has brought mixed results. On one hand, there are studies that show no semantic deficiency in ASD children, and in one case they outperformed the TD group in variety of words in spontaneous speech (Eigsti, Bennetto, & Dadlani, 2007). On the other hand, numerous studies show a semantic impairment, specifically with mental state verbs and semantic organisation (Eigsti et al., 2011).

The study of morphemes and ASD has produced mixed results. As these studies were all done before the current APA & WHO diagnostic systems were developed, more studies are needed to investigate the effect ASD may have on this linguistic domain (Eigsti et al., 2011).

Many studies have found that neurological problems often affect the phonological abilities of the patient. Low-functioning ASD people and young children with ASD have been reported with a considerable impairment in phonological abilities, while the majority of the ASD population do not seem to have such impairment (Eigsti et al., 2011).

A notable deviation from the language pattern of high-functioning ASD individuals is a specific group of people diagnosed as having Asperger's syndrome (AS); arguably a form of high-functioning ASD. AS children usually do not show a delay in language acquisition, and APA and WHO have developed a set of diagnostic criteria for AS where delay in language learning is especially noted as not being a characteristic of AS (American Psychiatric Association, 1994; Foudon et al., 2008; Frith & Happé, 1994; Wire, 2005, World Health Organization, 1992). The claim that AS individuals never show a delay in language development has been questioned. (Koning & Magill-Evans, 2001; Leekam et al., 2000). A symptom typically noted by psychologists diagnosing AS is a history of fluent, if somewhat archaic use of language during childhood, colloquially known as *adult speech*. This form of speech pattern and language use does not necessarily display a normally developing language speaker (Frith & Happé, 1994). It often displays a lack of awareness in social communication as the words spoken are taken literally. Others often refuse social contact sought by these individuals due to erroneous participation in dialogues and exorbitant affection for specialised interests making *normal* conversation and social interaction awkward. This can be argued as displaying a lack of normal language acquisition process rather than an advanced form of it (Frith & Happé, 1994; Koning & Magill-Evans, 2001; Saalasti et al., 2008; Woodbury-Smith & Volkmar, 2009).

2.4 Autism and L2 Acquisition

If a child does not acquire good proficiency in their L1, the acquisition of a second language as an older child or as a teenager is unlikely to be successful (Hamers & Blanc, 2000). Adequate input and opportunity for verbal interaction is a prerequisite for language development to take place in any language. This assumption has however been challenged in a summary given by an ASD consultant at the Icelandic State's Diagnostic and Counselling Centre (L. I. Gunnarsdóttir, personal communication, January 20, 2012).

The Icelandic State's Diagnostic and Counselling Centre processes the vast majority of pediatric mental disorder cases in Iceland. For many years, they have recorded cases where Icelandic ASD or AS children, aged 5 and upwards, with delayed L1 development, resulting in impaired Icelandic proficiency, have shown unusual English fluency, and in some cases fluency superior to Icelandic. So far they have not found any common factor to explain such an unusual development. A plausible culprit is ASD and ASs tendency to focus on very specific interests (the English language in this case), but the diagnostic team doubts that is the main reason. In some cases the children prefer to communicate in English. (L I. Gunnarsdóttir, personal communication, January 20, 2012). This seemingly non-traditional language acquisition process has not been researched and an extensive review of the available literature produced no reference to this phenomenon. It is very interesting to me as a former bilingual teacher to examine 1) whether it is in fact true that children with ASD with impaired L1 development, are in fact fluent in their L2, and 2) to delve into why this might be. The study will be described in the next chapter.

3.0 The Study

3.1 The Research Question

The main goal of this study will be to establish the level of both Icelandic and English proficiency of a limited number of ASD children that fall into the group described by the State's Diagnostic and Counselling Centre. Should their English fluency prove as advanced as described, a secondary goal will be to examine why these cases exist. The thesis of this essay therefore is:

> Can Icelandic ASD children, with history of delayed and impaired first language acquisition, acquire English as a second language despite first language acquisition difficulties and apparently no more English exposure than TD children? If so, what are the possible explanations for this non-typical language development?

The magnitude of the subject and the limits of BA thesis requirements, narrowed the scope of the study to an examination of whether the reported difference exists or not. A small number of participants was selected, based on very specific criteria. I interviewed the participants in Icelandic and English and reviewed some of their academic texts in both languages. I interviewed their supervisor as well about their diagnosis and professional evaluation reports.

3.2 The Participants

I chose high-functioning ASD students as subjects of the study. Low-functioning ASD children, even if they acquire language, often lack the skills to carry on a conversation and therefore do not form a viable group for this study.

I established cooperation with the special education department at Fjölbrautarskóli Suðurnesja (a large comprehensive secondary school) whose head master and supervising teachers generously gave their approval for this study. The supervisors selected a sample of three 16-18 year-old male students. The criteria for selecting participants in the study were:

- The students have a formal ASD or AS diagnosis or are ASD/AS candidates according to their supervisor's experience after working with them.
- The students have a history of delayed L1 acquisition, followed by consistently lower L1 proficiency than TD children.
- Supervisors or teachers claim the students have extraordinary English proficiency.

- To ensure that the students have similar background to TD children, they must not have, or have had, long-term connections to an English-speaking community.

3.3 Methods of Data Collection

The study was performed in two stages. First, I conducted an interview with each of the students, and reviewed samples of their academic texts in both languages. The purpose of the interviews was (a) to observe each participant's command in both languages; (b) to affirm or refute subjective historical accounts of their language acquisition; and (c) to determine to what extent they consider themselves bilingual. The academic texts gave an indication of their proficiency in written language. Their supervisor supplied the academic work reviewed.

The second stage was an interview with their supervisor about their background, both social and psychological, to form a more objective picture of the students' developmental background with emphasis on language acquisition. The supervisor reviewed the subjects' written psychological and evaluation reports for the interview.

The interviews with the subjects were conducted in a small conference room at the school. To lessen possible adverse anxiety effects on the interview results, the informants were given proper notice before the interviews were held, and they were held in familiar surroundings. The interviews were taped in order to make analysis easier and more accurate. Each interview was 40-50 minutes long. About 30 minutes were spent off topic, in both Icelandic and English, for me to assess their spoken language competence. I asked them specific questions about their language proficiency as the conversation allowed.

The subjects' supervisor was interviewed in the school as well. The supervisor had the relevant psychological reports for each participant. She supplied formal diagnoses, developmental history, and other formal psychological information that has been accumulated over the years for each participant. She also provided an overview of their educational requirements, their educational status and social adaptation to the school environment.

3.4 Method of Analysis

I categorised information from all interviews with participants and the supervisor, from the written texts submitted, and the recount of their psychological and evaluation reports into three categories:

- *Personal information*: All information about the subjects' personal background, including psychiatric information.

- *Language acquisition history*: All information pertaining to the language development of the subjects.
- *Icelandic and English language proficiency*: All information regarding the subjects' proficiency in both languages.

Each stage of the study gave various amount of information in each category. The interviews with the subjects, and text reviews, gave mostly information in proficiency and personal information categories, while interviews with the supervisor gave mainly information in the personal information and language acquisition history categories.

The personal information confirmed that the subjects fulfil the criteria for participation in the study. The language acquisition history affirmed the subjects' delayed or impaired language development as part of ASD. The Icelandic and English proficiency category provided an evaluation of the competence the subjects have in each language, and a comparison of their proficiency.

4.0 Results

The results are presented in two different sections for each informant. Each of the two sections is then divided into the three categories listed above. All names are fictitious in order to preserve confidentiality. The subjects were all afflicted by ASD to various extent. They all had a history of impaired or delayed L1 development. Both interviews and records displayed marked proficiency in their L2, while showing a varying degree of deficit in their L1.

4.1 Jonathan: Interview & Text Review

4.1.1 Personal information

Jonathan says he has AS. The computer allows him to communicate with peers without the strain of a live, personal conversation but he says he does not have any long term friends. Jonathan's interests lie mainly in technology and business, and he reads a lot of related news online, especially on BBC and CNN. He accesses a couple of Icelandic news agencies as well, but he prefers the English ones because they are more prestigious, and their news items are written using more professional language. This observation suggests Jonathan may have better literacy skills in in English than Icelandic.

Jonathan claims he has had no unusual exposure to English and no more than other children his age. Jonathan has never visited an English-speaking country and has no personal connections to native English speakers.

4.1.2 Language acquisition history

Jonathan's description of his L1 acquisition seems to me to be rather typical of Asperger children, in that he learnt to talk early and soon talked like an adult.

4.1.3 Icelandic and English proficiency

Jonathan finds it more difficult to find words and form sentences in Icelandic than English. He says he often stops in a middle of a sentence in Icelandic for want of a word. The word then usually comes first in English to him. I observed this on numerous occasions during the Icelandic part of the interview. I did not notice this hesitation during the English part of the interview. Jonathan finds certain Icelandic words difficult to remember, mainly the ones he uses infrequently. Jonathan says he thinks in Icelandic and believes his Icelandic is better than his English.

Jonathan prefers speaking in English and thinks he *belongs* better in English. He uses English a lot in everyday interactions, especially while playing online multi-player games. During play, he is reading and writing English all the time, often resulting in 10 or more pages of conversation. They play in teams and they have to plan themselves so it seems by description that the conversations are more than Internet jargon.

Jonathan does not think highly of his English pronunciation, but thinks highly of his grammar and spelling. I saw a recent unprepared English exam where he scored 85 out of 100. The 15 points missing were mainly because he answered short essay questions with one or two sentences. He says he ran out of time, as he is very meticulous when reading the exam instructions and therefore often does not have time to finish his exams. When asked about the extent of his English vocabulary, he loses a bit of confidence. During observation, he seems to have a good every-day vocabulary, but a quick verbal test indicates that his academic lexicon is probably more limited. Reviewing Jonathan's texts showed a consistent TD development but no considerable difference based on language.

Jonathan finds reading English a lot easier than reading Icelandic. He says the grammar is easier. He also finds it easier to remember the English words. Jonathan says he started playing video games at 4-5 years and at 9 years he started playing online games, and by that time he said he started really focusing on acquiring English. At 10 years he started noticing language errors by other players. He thinks he has better pronunciation than his peers.

The interview started in Icelandic, then switched to English in the middle of it, but Jonathan switched back to Icelandic about three quarters into the conversation. I found Jonathan rather a fluent speaker of English, and he is probably right about his pronunciation being better than his peers. He has a soft and free-flowing, nondescript accent. His word selection is primarily of Germanic origin, which is perhaps not unusual with Icelanders. His pronunciation in Icelandic is rather stiff. He speaks slowly and often stops to retrieve lost words. Observational evidence suggests that his English competence is marginally better than his Icelandic, and would quickly improve should he use it more regularly in verbal interaction.

4.2 Jonathan: Interview with Supervisor & Psychological File Review

4.2.1 Personal information

Jonathan has got a formal ASD diagnosis. He has also been diagnosed with hyperkinetic disorder and social phobia. The supervisor thinks Jonathan shows more AS symptoms than ASD ones. She agrees with his social phobia diagnosis, which seems to have been progressing from age 12. He also had problems with social interaction during kindergarten age. His clinical intelligence score is well below average, contrary to the supervisor's academic experience with Jonathan.

4.2.2 Language acquisition history

Clinical history does not indicate a specific delay in language development. His supervisor describes his speech as unusually formal for his age and sometimes out of context. His prosody is usually not reflective of the social nature of the conversation.

4.2.3 Icelandic and English proficiency

Jonathan's supervisor reported a serious impairment in his Icelandic syntactic competence. His semantic grasp and grammatical capabilities are minimal. Jonathan does have some difficulty in writing English, but his oral proficiency is excellent. He does not make syntactic errors in English, and has a sophisticated vocabulary and good comprehension of English.

4.3 Albert: Interview & Text Review

4.3.1 Personal information

Albert reads recreationally, but only in English. He is currently reading a sci-fi book that he thinks is difficult because of very long words.

4.3.2 Language acquisition history

Albert said he was a slow L1 learner. This was, he says, due to a temporary hearing loss that was not resolved until in his second year. Albert says his written competence is low in both languages, and that he is dyslexic. His earliest recollection of realising English as a different language was when he realised the Harry Potter movies were dubbed in Icelandic. The actors' mouths did not move in sync with their articulation. His parents have told him stories about his fixation on a feature-length cartoon in English, called Dragon Heart, when he was 2-3 years old. Without any help he deduced the name correctly in Icelandic. Albert

says he has listened and read a lot of English from an early age. English was always around, but so was it for others his age, he claims.

Albert has never visited an English-speaking country nor does he have any connection with an English-speaking community.

4.3.3 Icelandic and English proficiency

Albert does not think that he acts differently in one language or the other. He says that he has to translate most of his Icelandic dialogue from English, because he thinks in English. While drifting to sleep though, his thoughts turn Icelandic.

Albert thinks he is better at English than most of his peers. Some may have more vocabulary than he does, but they usually lack good pronunciation, and have a strong Icelandic accent, he says. Albert thinks his enhanced competence is perhaps due to his interest in the story behind everything. He is interested in mysteries in the video games and reads texts that others may quickly click through. When Albert encounters words in a text that he does not understand, he tries to deduce their meaning from the context. If that fails, he either looks them up online or holds the thought until the meaning is revealed later in the text.

Albert thinks his vocabulary in English is fine for getting by. He thinks it could benefit from more formal words and an increased academic lexicon. On a daily basis, English is Albert's preferred language of communication. He says he talks to his friends almost solely in English. When he is with his best friend, they mix the languages. Albert thinks his accent is on par with native speakers of English. Foreigners he meets usually accept him as a native speaker. Pressed for choice, Albert would opt for English, as he is better in English than Icelandic. He says he also has more friends and acquaintances that speak English to him.

The interview started off in Icelandic but switched halfway through to English and remained so. I noted that his English fluency is better than in Icelandic and he has rather a soft, fluid American accent. His grammar is usually correct and he does not seem to be translating from Icelandic. Albert is very much aware of the English pronunciation of others. Albert is verbally fluent in Icelandic, although his speech was sometimes slow because he was recollecting words, especially when talking about his interests.

Albert's texts in both languages show strong indication of dyslexia. Grammar and spelling are consistently incorrect. There is however a very big difference in the way he writes in each language. When writing Icelandic, the text is short and consists of 1-2 syllable, functional words. His English narrative is much more coherent, and lexically more diverse. His overall written competence, low as it is, is considerably better in English than Icelandic.

4.4 Albert: Interview with Supervisor & Psychological File Review

4.4.1 Personal information

His first record portraying his difficulty in social adaptation dates back to 9 years of age. Attention disorder, lack of social development, obsessive-compulsive behaviour, lack of interest and other impairments were noted from 11 years. Albert had an autism assessment done at age 14, where he scored below the threshold for ASD. A second autism assessment at age 15 still found him below the threshold. He was diagnosed with hyperkinetic conduct disorder. His mother and supervisor do not agree with the formal assessment. They claim his condition meets the ASD threshold. Albert's supervisor confirms his dyslexia.

4.4.2 Language acquisition history

Albert's early language acquisition was considerably delayed. He spoke single words at 14 months (TD at 11 months) followed by a long plateau period until his first word combinations at 30 months (TD at 17 months). This constitutes an interval of 15 months while TD children show an average interval of 6 months.

At 6 years, Albert showed normal language comprehension and small deviations in discourse and prosody. His strong points were phonology, discourse and prosody, while he lacked syntactic proficiency. A psychologist's report at 9 years described his delayed language acquisition. The reason given is hearing deficit until his second year. At 9 years he was assessed as below average in language acquisition, especially with regard to semantics. A neuropsychological assessment at age 12 found his receptive language cognition average, including general knowledge, semantics and social rules. Phonetic memory was below average. The results of his autism assessments at age 14 and 15 placed him below the threshold for language specific ASD deficits.

4.4.3 Icelandic and English proficiency

According to Albert's supervisor, his Icelandic proficiency has improved in recent years and his current Icelandic proficiency is close to TD. She still notes a more salient proficiency in English, and his tendency to move conversations into English.

4.5 Samuel: Interview & Text Review

4.5.1 Personal information

As a child, Samuel says he watched television, played video games and browsed the Internet, all in English. He thinks this was normal for his peers, but perhaps he spent a little

more time on this as he was picked on as a child and spent a little more time indoors than others. Samuel claims himself an avid consumer of videos and music in English and trains himself to acquire the accents in the music genres he takes an interest in. He says he plays video games but is no computer freak. He reads a lot for pleasure, and only in English. He reads a lot online, especially *Manga* (Japanese texts). He loves political news, horror books and mysteries, but he hates teenager books.

Samuel has only visited his sister in England a couple of times. For a short time, while very young, he had some interaction with people in the U.S. Air Force at the now defunct NATO base in Keflavík.

Samuel was a lot more aggressive than the other informants. He blatantly refused to acknowledge his ASD. When we shifted into English, he voiced clear and strong opinions, especially about ethics and politics.

4.5.2 Language acquisition history

Samuel's earliest English memory is from when he was 5 years old and thought he heard a burglar breaking in. His inner monologue turned into English while he was checking the sound. When he was 8 years old, he picked up an English copy of Icelandic folk tales, rather than the Icelandic version next to it.

4.5.3 Icelandic and English proficiency

It surprises Samuel how few of his schoolmates can speak English well and carry on a proper conversation in English. He asks: they all have the same background so why do they lag behind? He is irritated by his Icelandic accent.

Samuel claims he always preferred English to Icelandic, even from a very young age. He finds English easier than Icelandic as the grammar is simpler. Samuel finds himself more at home in English. His group of friends uses English more than Icelandic. If they start a conversation in Icelandic it changes quickly into English. This group is better in English than the rest of the class. He has the best writing skills and largest lexicon within the group, but others have better verbal skills. He has finished 11 pages of a book he is writing in English.

The interview started in Icelandic but one third into it, we switched to English. Samuel spoke Icelandic very slowly and it was obvious that it took him considerable effort to conduct a conversation in Icelandic. Sometimes his utterances sounded like he was a foreign speaker of Icelandic. When the interview switched into English, it went much smoother and he was obviously much more relaxed. His fluency in English was by far better than his Icelandic fluency. His accent is American and his irritation of his self-proclaimed Icelandic

accent was unfounded. He used much more complex words and longer sentences in English than Icelandic.

The text samples I reviewed reveal a great difference in his written proficiency in the two language. Following are samples from each language. The one in Icelandic is from a history essay and the second from the book he is writing in English:

> Fyrsta sýni plágunar í evrópu var í borgni Caffa í Crimea í 1347 meðan mongolia var að ráðast á borgina Herin undir Jani beg byrjuðu að skjóta Dauðum líkum sem höfðu pláguna yfir veggina inní borgina.Men flúgðu borgina og spreiddi pláguni með bátnum til Sicily(oct 1347og svo Genoa og venice(1348) og svo breyddist það norður.

> Warsaw sat there on a small chair holding a hunting rifle she had found in the shack. She then stood up and began to walk around the basement looking for some food. She had not eaten the whole day. She then found a can of baked beans. She went to the old stove in the basement and tried turning it on. It took her five minutes but she finally managed to turn on the stove.

The Icelandic text shows an extremely underdeveloped control of Icelandic, and the sentences seem translated from English. The English text however is much more refined. Samuel demonstrates this difference consistently in his verbal dialogue. Samuel's case seems to give a very clear answer to the question of an L1 impaired individual acquiring native-like proficiency of an L2.

4.6 Samuel: Interview with Supervisor & Psychological File Review

4.6.1 Personal information

Samuel was diagnosed two years ago with ASD. In addition he has been formally diagnosed with receptive language disorder, attention deficit without hyperactivity, anxiety disorder, and specific developmental disorder of motor function. The late intervention in Samuel's developmental deficits has probably caused the advanced form of disorders he is currently experiencing.

His general adaptive skills, e.g. communication skills, daily functions, social adaptation and motor skills are severely below average. Although he scored below the diagnostic threshold for obsessive-compulsion disorder two years ago, his supervisor claims

he would now be diagnosed with that disorder. His parents already observed many of his disorder traits at age 4-5. His cognitive development is below average.

Samuel's academic studies are well below average, but he continually refuses support. He expresses a very distorted picture of his academic competence. This also applies to his social skills. He has been socially isolated throughout his childhood, until very recently. He has formed a group with 2-3 individuals, who themselves show atypical social behaviour. Samuel is the leader of that group. His interests are very specific.

4.6.2 Language acquisition history

Samuel's language acquisition was delayed from infancy. His spoken language was almost incomprehensible until he reached pre-school age. At that time he started combining words into sentences. He attended pre-school from age 4 and limited language development was noted at the time. Both his ASD consultant and supervisor note how stiff he is in L1. He scores well over the threshold for the communication criteria of ASD.

4.6.3 Icelandic and English proficiency

Both his supervisor and psychologist say he sometimes sounds like a foreigner, frequently making syntactic errors common with foreign speakers of Icelandic. Prosody and discourse are peculiar and often hesitant. It takes him a long time to understand questions and when retorting he has considerable difficulty in finding words. All of Samuel's teachers agree that he has serious difficulties in expressing himself in Icelandic, both verbally and in writing. His verbal fluency is very little and he avoids expressing himself in class in Icelandic. The only class Samuel is passing this semester is the English class. He prefers English as a communicative language and is usually heard speaking English in the corridors.

The interviews with the subjects were successful. They did not seem overtly anxious and answered all the questions promptly. I passively encouraged them to expand on their interest so I could evaluate their fluency in both languages. The supervisor gave a good, factual overview of the boys' developmental history, supported by professional reports. The drawback in the formal data collection was that the reports and data available for each subject varied in both form and length of period. Information was available from reports dating back to 6 years for Albert, while Jonathan's only official report is from 2012. Also, the data on language acquisition only applied to their Icelandic proficiency, so I had to rely mostly on their own account and that of the supervisor.

5.0 Discussion

Each of the three informants represents different parts of ASD. Albert has not got a formal ASD diagnosis although evidence suggests that he displays many characteristics of ASD. This brings attention to the issue that no psychiatric assessment is ever final. Symptoms that individuals show in certain circumstances may not show in another. Also, long-term observations may result in different professional opinions. According to his supervisor, Albert consistently shows symptoms of ASD at home and in school, and he therefore fits the colloquial category of *being on the spectrum* without an official autism diagnosis. Albert's L1 acquisition was delayed during the first 1-2 years but has since caught up and is now close to TD peers.

Jonathan has been diagnosed with ASD, accompanied with more deficits, as is often the case with mental disorders. His apparent early and advanced language development is questionable as evidence suggests AS language development is hampered by autistic traits, but given the high-function abilities of AS children, they are able to mask those traits with *adult speech*, i.e. a large lexicon but without the semantic understanding.

Samuel has been diagnosed with ASD, along with a smorgasbord of other mental and behavioural disorders. There is evidence of more disorders that have not been formally diagnosed. His lack of social and other adaptive skills place him firmly within ASD. His L1 acquisition is severely impaired.

All subjects' personal history is similar. All of them have a history of childhood seclusion from their peers. This is a strong indication of their ToM deficiency. They are or were unable to carry on a normal conversation in their L1, as they do not possess the necessary tools; they fail at the discourse, pragmatic functions and prosody language domains. Samuel was the worst case as his speech could hardly be deciphered at all until kindergarten age. The boys' childhood seclusion made them choose entertainment where they did not have to socialise. Cartoons and video games, mostly in English, were their common entertainment consoles. They then progressed to surfing the Internet in search of entertainment, again in English: news, interesting stories and online gaming. They all play sci-fi multiplayer online games where they interact with other people but never in person, and it all takes place through English. Both Samuel and Albert have managed to form some sort of personal friendships with a very limited number of people, where English is the preferred language of communication. Jonathan is still very isolated.

None of the boys has any regular ties with an English-speaking community. Only Samuel has ever visited an English-speaking country. Samuel had a brief connection to the U.S. Air Force base in Iceland while very young. Otherwise, they have had no personal, social relations with any native English speakers. Their regular English use is limited to their computer use and speaking with their friends.

The informants' current Icelandic proficiency varies, but with strong common traits. Samuel is without doubt the least proficient Icelandic speaker. His dialogue was extremely monotonous and simple, and it was obvious he does not have native control of discourse, pragmatic functions or prosody of the language. Both Jonathan and Albert were much more adept at Icelandic, although they showed signs of domain impairment, especially in discourse and pragmatic functions. All three's lexicons in Icelandic are more limited than their TD peers.

All boys outperform their TD peers in English proficiency. They have very good control of their discourse and pragmatic functions. Their intonation is much more natural than when speaking Icelandic. Their syntactic knowledge is good and they seldom make grammatical mistakes when speaking English. There is no sign of a semantic deficit and they have a satisfactory general lexicon with an inflated vocabulary within their interest boundaries. Their English fluency seems very good and close to native speakers of English. Samuel is of extraordinary interest, because his English proficiency surpasses his Icelandic proficiency by far. They all prefer English and succeed in using it in social circumstances, and feel they belong better in English than Icelandic.

To summarise, two of the informants showed considerably more competence in English than Icelandic. The third one seemed rather a balanced speaker. Their L1 is Icelandic, and they have limited social exposure to English as L2; it was mainly limited to non-interactive entertainment in early childhood and interactive entertainment in late childhood. As they were exposed to English mainly after or at the end of the 48-month language acquisition period, their competence can be assumed as consecutive bilinguals. They however do not have a typical language development history for bilinguals. They show abnormal or serious delay in L1 acquisition. Later in childhood all of them show an ongoing impairment in L1 proficiency, but to various extent. Contrary to accepted theories on language acquisition, these students show an advanced form of L2 acquisition despite considerable delays in L1 acquisition, and in one case, a serious continuing L1 deficiency.

The second part of the research question gives plenty of space for speculation. The reasons why L2 proficiency exceeds the subjects' L1 proficiency are not clear. All subjects

suffer from one form of ASD or another, so there is a strong inclination to try and find a neurological reason for this phenomenon. A possible explanation may lie in how TD consecutive bilinguals have been observed in producing language. Brain imaging shows that to some extent, consecutive bilinguals use different parts of the Broca's area to produce each language. Since ASD is a neurological development disorder, it may have a negative effect on the L1 production area, while sparing the L2 production area.

Another reason might be that while ASD children learn language the same way TD children do, more influence is needed for them to wilfully adapt the production skills for language. The impetus for successful social interaction seems missing in ASD children. As social interaction is a fundamental basis for advanced language production, it may suffer seriously as a result. The access to English non-social entertainment, and later, social entertainment through computers, may have acted as the catalyst necessary for the subjects to attain the language production facility in English. In fact, one subject clearly stated his English acquisition desire when he started playing multiplayer games online. This suggests that at least high-functioning ASD children have ability and need to socialise where an L2 provides the means of communication.

Although the study was small and not standardised, it suggests that there is more to language acquisition than current theories and research have so far postulated. If L1 proficiency is not a prerequisite to L2 development, then there are big gaps in the language acquisition theories. Since all subjects are afflicted by ASD, arguments can be made for neurological anomalies allowing ASD people to activate their L2 language production facilities while their L1 is damaged or unavailable altogether. If that were the case, it would mean that ASD treatment methods should take notice of this apparent ability, to enhance ASD people's chance of communicating with the rest of the world. Further study is required to ascertain the findings of this study, but the indications are strong.

6.0 Conclusions

The study results suggest a phenomenon, which theorists seem unaware of. Three teenage students with ASD specific impairment in L1 Icelandic acquisition, show almost native control over English as L2. Extensive review of current literature covering language acquisition, failed to produce any reference to this phenomenon. To my knowledge, no research has been conducted about this non-traditional language acquisition process.

The data I collected suggests that there are aspects of language acquisition that have so far remained obscure to researchers of language development. The vast majority of researches in both language acquisition and autism take place in large language communities. These communities are usually self-sufficient in entertainment, i.e. they either produce themselves or dub cartoons, TV-shows, movies, video games and online media, drastically diminishing the chance that ASD children will unwittingly be exposed to L2. The small language community that Iceland is, and its dependence on English entertainment media, has made it an everyday experience for Icelandic children to access the English language in mass quantity. Possibly, the formulaic and repetitive input of computer games reinforces L2 development of children who have difficulty with human social interaction that would be conducted in their L1.

The fact that ASD affects all study subjects, further suggests that new research into ASD bilingual language acquisition may improve current theories on language processing and production. We already know that while compound bilinguals produce both languages in roughly the same part of the Broca's area, consecutive bilinguals, which the subjects in the study are considered as, produce each language in slightly different locations in the Broca's area. If an ASD child can produce L2 fluently, but L1 like a foreign speaker, either the theories of how a child acquires their languages are insufficient, or the ASD child has in fact full processing potential in their L1. This potential is transferred to the L2 production area, which is not affected by the neurological disorder. If the latter proves correct, new treatment methods for language impaired ASD children might be in order. If the ASD child is acquiring their L1 in a TD way, then consecutive bilingualism, or late childhood L2 exposure, should be encouraged. A child not able to communicate properly in their L1 because of neurological deficit would then use L2 to utilise their L1 language acquisition for communication. This might prove groundbreaking when working with low-functioning ASD children that have not acquired productive language skills in their L1.

The Icelandic State's Diagnostic and Counselling Centre has recorded dozens of instances where high-functioning ASD children have shown an extraordinary fluency in English, while hardly being willing or able to conduct a conversation in Icelandic. In this study, I examined three subjects from this group and confirmed this unconventional language development. The study was limited both in scope and number of participants. There was no standardised testing involved, and the results gathered were mainly subjective data from the subjects, their teachers and my own observations; and objective data from social science professionals. But these cases exist in large numbers, and extensive search has failed to procure any such research in the fields of either social or linguistic science. The questions researchers need to ask are: Why can autistic children acquire an L2 superior to their apparent proficiency in L1? How can L2 as a new tool for ASD children help professionals develop means of communication with the low-functioning ASD population? If this study's results merit a more structured, professional study of this phenomenon, then the study may mark the first stepping stone in moving bilingual linguistics and autistic development research to a whole new level, where all ASD individuals are by default considered harbouring a functional language - just waiting for a proper medium.

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