A Processability Approach to Instructed Language Learning in Multilingual Contexts
Developmental Stages from a Receptive Competence Perspective

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Abstract   Existing research indicates a qualitative difference between Second Language Learning and Third Language Acquisition, and certain psycholinguistic and developmental aspects of multilingual learners merit investigation. The present article examines stages in receptive learner acquisition of English as a Third Language at Italian medium primary schools in South Tyrol (Italy) employing a picture selection task and implicational scaling analysis. It highlights the role that processing approaches to acquisition proposing constraints on developmental readiness and cross-linguistic influence may play in the emergence of receptive competence in morphosyntactic structures.

Keywords   Processability Theory. Developmentally Moderated Transfer Hypothesis. Third Language Acquisition. Teachability Hypothesis. Multilingualism. Receptive competence.

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1 Introduction

An increasing proportion of the world's population is learning English as a third or additional language because of mass migration, globalisation and technological advances, or the presence of autochthonous minority languages. Inevitably, questions arise concerning decisions on didactic approaches to an eventual third language taken by schools in these regions, which

> have the need to go beyond bilingualism and to promote trilingualism and multilingualism as one of the most important aims in education. (Cenoz, Gorter 2005, 1)

Research into bilingualism has found existing competence in two languages to create advantages for Third Language Acquisition (TLA), which benefits from more language learning experience (Golonka 2010), the effects of bilingualism on cognition (Bialystok 2009), and access to two linguistic systems (Cenoz 2003). Competent users of two languages may also display more positive attitudes towards learning a third language potentially thanks to sociolinguistic factors (Brohy 2001). From a psycholinguistic perspective, bilingual competence is said to feature the characteristics of non-linearity, individual variation, and interdependence, amongst others (De Angelis 2007; Jessner 2008). TLA and multilingualism have thus emerged in their own right, separate to that of bilingualism, and have produced a variety of models and theories focusing on the role of cross-linguistic influence (CLI) (Rothman, Cabrelli Amaro 2010; Kellerman 1995), metalinguistic knowledge (Herdina, Jessner 2002), and the extent to which L1 and L2 may influence acquisition of a third language (Bardel, Falk 2007; Hammarberg 2001).

2 Study Objectives

The present article is based on an investigation of developmental morphosyntactic stages in early-stage learners of English L3 in an instructed setting using Processability Theory (Pienemann 1998, 2005) as a framework. Research questions guiding this cross-sectional study are the following:

1. In the groups tested, does receptive grammar develop in the same stages that have been found for productive grammar and which are predicted by PT?
2. Do the L3 English study participants transfer features from their L1 and/or L2 to English? If so, under which constraints does transfer take place?

3 Processability Approaches to Language Acquisition

A study of receptive acquisition of morphosyntactic structures in early stage third or additional language learners at primary school from a processability perspective constitutes a little-explored means of investigating the proposed qualitative difference between Second Language Acquisition (SLA) and TLA. Processability Theory (Pienemann 1998; 2005) is a cognitive approach to language acquisition that takes the theory-building capacity of the learner to be the driving force behind the acquisition of language competence, and seeks to explore the ways in which linguistic skills become automatic, or procedural (Jordan 2004). PT has its origins in the morpheme order acquisition studies of the 1970s (Bailey et al. 1984; Dulay, Burt 1973), which were carried out on the interlanguage of both child and adult L2 English learners. These took inspiration from studies on first language acquisition conducted in naturalistic settings (Brown 1973; Cazden et al. 1975). Researchers found that competence in certain morphosyntactic structures emerged in the same set order for both L1 and L2 learners regardless of input, forming the L1=L2 hypothesis (Jordan 2004) – a phenomenon that was attributed to unknown mechanisms at the time. Attention was also turned to second language (L2) learners of different L1 backgrounds (Pica 1983; Pavesi 1986) with the aim of exploring whether L2 acquisition could be a universal and predetermined process independent of the L1 variable, and Pienemann devised the Teachability Hypothesis (TH), which seeks to provide

> a set of psycholinguistic background information on which teaching methods should be based. (Pienemann 1989, 76)

The TH's treatment of the theory-practice interface and the notion that "teachability is constrained by processability" (Pienemann 1998, 250) has since informed teaching methodology and syllabus design – an area that previously tended to rely on intuitive ideas for grading levels of difficulty in materials. Similar to Vygotskian notions of the Zone of Proximal Development (Vygotsky 1978) and Krashen's ×+1 hypothesis (Krashen 1982), the TH predicts that

> instruction can only promote language acquisition if the interlanguage is close to the point when the structure to be taught is acquired in the natural setting. (Pienemann 1985, 37)

The TH is supported by a substantial body of empirical evidence (Ellis 2008; Boss 1996; Dyson 1996; Mansouri, Duffy 2005), and the subsequently devised PT framework continues to represent a theoretical model with strong predictive power for the acquisition of morphosyntactic structures (Jordan 2004).

4 Uniqueness of Study

PT-related research has typically drawn on empirical productive learner data, leaving receptive learner data and reception-production interaction mostly unexplored (Ellis 2008), even though Pienemann has claimed that

> [t]he logic underlying Processability Theory (PT) (Pienemann 1998; 2005) is the following: at any stage of development the learner can produce and comprehend only those second language (L2) linguistic forms which the current state of the language processor can handle. (2007, 13; italics added)

Among the few studies dedicated to investigating receptive grammar acquisition using the PT framework are Keatinge and Kessler (2009), Spinner (2013), and Spinner and Jung (2018).

The present article describes a cross-sectional study that operationalises the emergence of receptive morphological structures in L3 learners, focusing on receptive data. The importance of considering receptive data for a comprehensive theory of language competence is outlined by Tasseva-Kurktchieva:

> Comprehension and production are equally meaningful as indirect measures of linguistic competence; thus, if one is to really assess linguistic knowledge, one must consider both of these. (2015, 493)

Buyl and Housen's study dedicated to multilingual contexts (Buyl, Housen 2015) examining both productive and receptive data found receptive and productive grammar acquisition to comprise the same PT-related developmental stages and to be governed by the same processing factors. However, counterevidence was uncovered by Buyl's 2015 study, which found receptive and productive grammar acquisition to be partially governed by different mechanisms (Buyl 2015).

5 Current Issues Surrounding Language Processing

Some chronological differences are said to arise between learner reception (decoding) and production (encoding). The general assumption in SLA/TLA is that comprehension of morphosyntactic structures emerges earlier than production of those structures (Dixon, Marchman 2007; Clark, Hecht 1983; Bates et al. 1988; Gass [1997] 2017; Chondrogianni, Marinis 2012). This could imply different processing schedules for production and reception of the structures featured in the present study.

Another important aspect to language acquisition is the concept of separate workspaces for production and comprehension in the brain. Larsen-Freeman argues for "overlap between a comprehension grammar and a production grammar" (2002, 282). Conversely, Levelt (1989) conceptualises language production and comprehension to involve two separate modules. Buyl and Housen (2015) consider the repercussions of production-based PT constraints for comprehension to enhance insights into developmental stages, while Keatinge and Kessler's (2009) study supports the emergence of receptive competence according to a PT-governed schedule in a similar manner to the present investigation. Concerning the issue of CLI, a considerable body of evidence for CLI has been gathered from bilinguals and a variety of models elaborated for TLA (Flynn et al. 2004; Rothman 2013; Bardel, Falk 2007; Slabakova 2016). The PT-aligned Developmentally Moderated Transfer Hypothesis (DMTH) (Pienemann et al. 2015) addresses questions of transfer, which is said to be constrained by the capacity of the L2 language processor (Lenzing 2021). Particularly relevant to this investigation, with its focus on receptive competence and L3 acquisition, is Buttkewitz's (2018) claim that CLI in TLA, even when constrained by the DMTH, is more frequent in reception than production in typologically similar languages. The English-German-Italian language constellation of this study throws up a number of typological similarities.

6 Specifics of PT and DMTH

6.1 Stages and Processing Devices

PT conceives L2 acquisition in terms of sequential progression through a series of stages. Most studies number the stages 1-5 or 1-6, with Stage 1 comprising the processing skills that are first acquired, and Stages 5 or 6 the last to be acquired. The learner is proposed to pass upwards through the stages and activate the procedures in a cumulative fashion. Table **1** (here without numbered stages) illustrates the schedule.

Table 1 Developmental stages hypothesised for L2 English morphology with examples. Source: Di Biase et al. 2015

Processing Procedure	Structure	Example
S-Bar Procedure	e.g., subjunctive marking in subordination	*I suggest he eat less.* *It's time you left.*
Sentence Procedure	SV agreement: 3rd person sg *-s*	*Peter loves rice.*

Processing Procedure		Structure	Example
Phrasal Procedure	NP Procedure	phrasal plural marking	*these girls* *many dogs* *three black cats*
	VP Procedure	AUX+V: have+V-*ed* MOD+V be+V-*ing*	*they have jumped* *you can go* *I am going*
Category Procedure		past -*ed* plural -*s* possessive '*s* verb -*ing*	*Mary jumped* *my brothers working* *Mary's car* *he eating*
Lemma access		single words formula	*station here* *my name is Pim*

Table 2 Hierarchy of PT processing procedures – morphological development.
Source: Pienemann 2005

Stage	T1	T2	T3	T4	T5
S-Bar Procedure	–	–	–	–	interclausal information exchange
Sentence Procedure	–	–	–	interphrasal information exchange	–
Phrasal Procedure	–	–	phrasal information exchange	–	–
Category Procedure	–	lexical form variation	–	–	–
Lemma access	words & formulas	–	–	–	–

The divisions between the stages set out in table **2** are the following:

Stage 1 (Lemma Access)

No language-specific processing procedures are involved in this stage, with conceptual structures being mapped onto single words and formulae (Pienemann 1998). Learners produce 'chunks' of language or formulae often memorised or repeated after the teacher. There is no transfer of grammatical information (Lenzing 2021).

Stage 2 (Category Procedure)

Learners are said to acquire strings of words and lexical morphemes e.g. plural '-s', or past tense '-ed' and annotate them for their syntactic category, which, again, requires no exchange of grammatical information (Pienemann 1998). The canonical SVO word order is followed for English.

Stage 3 (Phrasal Procedure: Verb Phrase and Noun Phrase)

Learners acquire phrasal morphemes, in which there is an exchange of information between the constituents of phrases. This may be plural agreement for noun phrases, e.g. 'two dogs', and, for verb phrases, the auxiliary or the participle, e.g. 'they have jumped'. Learners also vary the syntax by placing adjuncts in initial clausal position and start to define position in terms of phrases instead of words (Pienemann 2005).

Stage 4 (Sentence Procedure or S-Procedure)

The S-procedure exchanges information between phrases in a sentence and accesses the target language word order rules (Buyl, Housen 2015). It is not until this stage that learners are said to acquire inter-phrasal morphemes such as the 3rd person singular of lexical verbs.

Stage 5 (S-Bar Procedure, or Subordinate Clause Procedure, sometimes known as 'Cancel Inversion')

The subordinate procedure is proposed to be acquired at stage 5, which allows learners to distinguish between main and subordinate clauses. Most early-stage learners will not have reached this stage and it is therefore not included in the ELIAS GT instrument used in this study.

A parallel, yet separate, schedule exists for syntactic processing, which Pienemann predicts to emerge before morphology (Dyson 2009).

6.2   Variational Versus Developmental Schedules

While SLA research has established that learners go through developmental stages, it is acknowledged that some variation within and between these stages may occur (Dyson 2009). Such variational features are said to be more responsive to well-timed instruction, as their acquisition is typically free of strict teachability constraints (Pienemann 1989). The nature of this variation is still a matter for exploration (Ellis 2008). In fact, to account for learners' apparent unexplained progressions, Di Biase et al. (2015) argue for the existence of 'soft barriers' that address intra- and inter-stage sequences for English. Research has also focused on the idea of learner orientation towards simplification and standardisation, which may be determined by environment and psychological make-up (Pienemann 1989; Dyson 2004). It has also been proposed that learners have a 'Hypothesis Space' containing language options when they attempt to produce language beyond their current level (Liebner, Pienemann 2011), such as a 'Wh- question' (Stage 5) while at developmental Stage 3. Regarding identification of structures, Dyson (2009) claims that variational features often seem to include grammatically important but communicatively redundant linguistic items. Larsen-Freeman gives the example of copula omission, as in 'Julia happy' (1991, 282), to be a variational feature, while other studies have also pointed towards auxiliary verbs, articles and the third person '-s' (Ellis 1988). Ellis mentions saliency, and that

> [i]f learners are motivated primarily by communicative need, then they will probably retain only those features that they perceive to be important for communication. (2008, 868)

Different to the notion of interlanguage being governed by order of acquisition in the natural setting as outlined in the TH, once a variational feature can be produced at all it is said to be teachable (Pienemann 1984).

6.3   Defining Emergence

Ellis (2008) calls for a clear definition of variational versus developmental features to reduce ambiguity around features that fail to conform to PT's predictive framework. This, as well as a lack of clarity over the identification of Stage 1 formulaic expressions (Ellis 2008), is an issue that may have an impact on the operationalisation of PT, where the set stages rely on observing whether a structure has been acquired in a procedural manner. The emergence criterion used in PT studies is claimed to detect regularities more systematically than

accuracy-based methods such as grammaticality judgements (Pienemann 1984). Pallotti (2007) calls for continued focus on the construct of the emergence criterion, described by Pienemann as the "*first systematic use* of a structure" (Pienemann 1984, 191; italics in the original). For Pienemann, pinpointing the end of the acquisition of a certain structure would imply *mastery* of the correct use of target norms, which is not the purpose of the emergence criterion. This distinction between emergence and native-like acquisition is clearly important in preventing inconsistencies caused by applying different operational criteria to the same data. Care should be taken not to confuse emergence with the production (or receptive understanding) of memorised chunks (Pienemann et al. 2016), which is why in testing instruments morphemes should appear with a variety of lexical items to ensure that formulaic language is not counted as morpheme insertion (Pienemann 1998).

6.4 The Developmentally Moderated Transfer Hypothesis

The DMTH was elaborated in response to the need for approaches based on the PT hierarchy to take a position on language transfer following research into L3 and additional language learning (Håkansson 2019) and to counter the assumption that PT is a no-transfer theory (Pienemann 2011). According to the DMTH, all learners are said to follow the same trajectory and are not massively advantaged if their L1 is typologically similar to the L2 (or L3). Features of previously acquired languages may only be utilised once the developing target language system can process them, and these features may be visible as both facilitative and non-facilitative transfer in a predictable manner (Pienemann et al. 2013). The DMTH claims that transfer does not aid processability, but that processability aids transfer. Any resulting increased accuracy is a result of facilitative transfer (Buttkewitz 2018). (Psycho)typological similarity is not a sufficient predictor transfer, as challenges arise in the differences between expressions in various languages, and the variety of ways to classify languages for analysis, such as genetic relationships, morphological type, configurationality and head- and dependent marking (Håkansson 2017). Håkansson's 2017 study on learners of Swedish with a variety of background languages found that one learner did not make recourse to their L1 Italian as they had not yet reached Stage 4 in their Swedish interlanguage. This study would expect similar results in that English and German contain typological similarities in terms of morphosyntax, yet any facilitative and non-facilitative transfer would take place under developmentally moderated constraints.

7   Participants

Two intact, mixed-gender groups of 7-8 year olds (group 1, n=42), and 9-10 year olds (group 2, n=32) attending an Italian-language primary school formed the sample. The subjects receive 4 weekly lessons of English from the first school year, at 5-6 years old. The population investigated displays endogenous bilinguality (presence of L2 community) for Italian and German, and English is an exogenous language (absence of L3 community) (Hamers, Blanc 2000).

According to Hoffmann's definition of trilinguals, the typical participant of this study falls into the following category:

> (iii) third language learners, i.e. bilinguals who acquire a third language in the school context. (Hoffmann 2001, 3)

A small number of children (9.1%) were of migrant backgrounds and fall into the following category:

> (ii) children who grow up in a bilingual community and whose home language (either that of one or both parents) is different from the community languages. (Hoffmann 2001, 3)

However, creating a distinction between learners of English as an L3 or English as an additional language (Ln) was not judged as useful for this study, and current research (e.g. Rothman et al. 2019) tends to make the main distinction between L3/additional language and L2 acquisition.

The participants receive 10 hours a week of instructed L2 German. The level of German for participants with German spoken at home (14.6%) is clearly estimated to be higher, especially for receptive competence, than the level of those without German at home. Therefore, both groups feature varying CEFR levels ranging from A2 to C1/2 German for comprehension. Italian, the official medium of the school, is the language spoken at home by the majority (74.6%), and German is mostly acquired sequentially. Exposure to English outside school is assumed to be minimal, and was not controlled for. Neither of the two languages of the Province is a heritage language, and both are granted equal status at Province level (Marko et al. 2008).
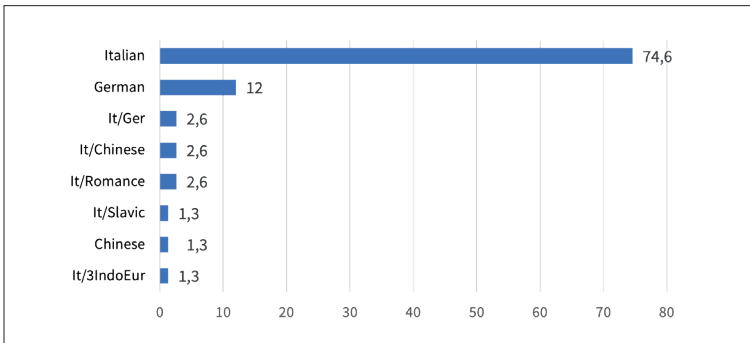
Chart 1   Distribution of participants' home language in % (groups 1 and 2 together)

8 Data Collection Methods

Data collection was carried out to observe learners' comprehension of selected early-stage morphosyntactic structures set out in table **1** according to the PT hierarchy framework within a cross-sectional study design.

8.1 Instrument

The learners' receptive grammar knowledge was tested by means of the ELIAS Grammar Test (ELIAS GT) versions A and B (Kersten et al. 2010). This is a picture selection task (3 multiple choice options correct/incorrect/distractor) based on the Reception of Syntax Test (Howell et al. 2003). The two A and B testing sessions were administered 7 days apart to maximise the concentration span of the participants. The ELIAS GT relies on morphosyntactic contrasts. It aims to measure learners' knowledge of nine morphosyntactic structures by instructing them to match orally presented prompts containing a target structure with pictures representing the propositional content of this prompt (Buyl, Housen 2015). Each prompt is accompanied by three drawings (see Appendix 2), with one representing the prompt, the second an error that contrasts with the prompt grammatically (e.g. singular instead of plural), and a third functions as a distractor that depicts a different propositional content to the prompt (e.g. a picture of a dog to accompany the prompt 'cats').

All 54 picture selection tasks contained in the ELIAS GT for analysis were included because apparent receptive competence in 6 instances of the following 9 morphosyntactic items could be observed:

SVO (SVO)	canonical word order
Plural (Plu)	plural marker -s (absent vs. present)
Negative (Neg)	negation, expressed by the sentence negator not (absent vs. present)
Genitive (Gen)	possessive -s (absent vs. present)
Subject pronoun (ProSbj)	he/she (as distinct from object pronoun)
Possessive determiner (Poss)	his/her to indicate possession
Object pronoun (ProObj)	him/her (as distinct from subject pronoun)
Agreement copula (AgrC)	agreement; copula verb be, present simple, 3rd person (singular vs. plural: is/are)
Agreement verb (AgrV)	agreement; full verbs, present simple, 3rd person (singular vs. plural)

Instances of ≥5/6 and 6/6 target-like responses, where ≥5/6 indicates five or more target-like responses achieved and 6/6 indicates that all six responses were target-like, were taken into consideration for analysis. ≥3/6 and ≥4/6 were discarded as an emergence criterion, and as PT does not consider a grammatical structure as acquired (for production) when only one or two instances of target-like use are found (Kessler, Liebner 2011), the ≥1/6 and ≥2/6 criteria were not used. This decision to consider just ≥5/6 and 6/6 is described as 'statistically reliable' (Buyl, Housen 2015, 536), and minimises the effect of chance guessing.

The calculation involved is set out in the following table.

Table 3 Emergence/acquisition criteria. Source: Buyl, Housen 2015

n	6						
π	0.33						
k	0	1	2	3	4	5	6
$p \geq k$	1.00	.91	.64	.31	.10	.02	.00*

Notes. n = number of prompts; π = chance level; k = number of correct responses; $p \geq k$ = probability of obtaining score k or higher by chance; * = score is above chance performance (p > .05).

As mentioned in section 6.3, criteria for emergence may differ from study to study and their selection often implies a value judgement.

8.2 Methodological considerations

This study examines inflectional/lexical morphemes (i.e. morphology) and not syntactic structures. It therefore does not investigate processability-determined syntax schedules. To my knowledge, no studies have been carried out on differences in morphology and syntax schedules for receptive acquisition. The lemma access stage (Stage 1)

and S-bar procedure stage (Stage 5) are excluded from this study, which features Stages 2, 3 and 4. Concerning the possible range of early-stage morphosyntactic phenomena to observe, the possessive 's' structure, which does not always appear in PT schedules, is present as it may be useful for identifying possible German L2 transfer. Its position in the PT hierarchy has varied according to different studies, with Johnston (1985) and Håkansson (2019) placing it at Stage 3 and Pienemann (1998) at Stage 2. This structure is included in the present study at Stage 2. Bettoni and Di Biase (2015) do not include either possessive determiners (Poss) or personal pronouns (ProSbj and ProObj) in the morphological schedule used in their longitudinal study, claiming that these are lexical and thus display a lack of predictability and generalisability. However, along the lines of Buyl and Housen's 2015 study, the present study observes comprehension of all three of these structures, placing them at Stage 2. Following Håkansson's 2019 study on receptive competence in children, the nine structures (below: 'Phenomenon') and sentences used for the picture selection tasks (below: 'Example sentence'), with slight modifications made to the abbreviations, are the following:

Table 4 Nine structures used in comprehension task. Source: Håkansson 2019

Abbreviation	Phenomenon	Example sentence
AGRv	Subject-verb agreement: Full verbs singular / plural	*The sheep eats* *The sheep eat*
AGRc	Subject-verb agreement: Copula verbs singular / plural	*The deer is white* *The deer are white*
POSS	Possessive: Absent / present	*The girl is kissing the boy* *The girl is kissing the boy's dog*
NEG	Sentences: Affirmative / negative	*The boy is running* *The boy is not running*
PLU	Inflectional morpheme: +/- Plural -*s*	*Cat* *Cats*
POSS pro	Possessive pronoun singular: Masculine / feminine	*His cat* *Her cat*
PROog	Personal pronoun singular (object): Masculine / feminine	*The girl is kissing him* *The girl is kissing her*
PROsg	Personal pronoun singular (subject): Masculine / feminine	*He is singing* *She is singing*
SVO	Word order	*The boy is touching the girl* *The girl is touching the boy*

The present study comprises six Stage 2 (category procedure) phenomena that lend themselves to testing learners' comprehension:

> Stage 2 – Subject Verb Object (SVO), Plural (Plu), Negative (neg), Genitive (Gen) or Possessive -s, Pronoun Subject (ProSbj) and Possessive Determiner (Poss)

> Stage 3 – Pronoun Object (ProObj)

> Stage 4 – Copula Verb Agreement (AgrC) and Lexical Verb Agreement (3rd person singular) (AgrV)

Inclusion of six Stage 2 structures led to a high degree of intra-stage variability and reduced scalability, even though the structures were arranged, where possible, for increasing difficulty (Bettoni, Di Biase 2015). The stages were therefore 'collapsed' and the average score taken to indicate emergence (see Appendix 1).

9 Data Analytical Methods

9.1 Implicational Scaling

The present study uses implicational scaling, which is the preferred method of analysis in PT studies (Pienemann 2005). It seeks to arrange the morphosyntactic structures into a hierarchy whereby the emergence of one structure implies the previous emergence of one or more structures for each learner (Ellis 2008).

9.2 An Explanation of the Matrices

Progress through the stages is indicated from left to right by placing the Stage 2 structures predicted to be acquired earlier on the left proceeding through Stage 3 to the most difficult (Stage 4) on the right. The numbers of target-like responses for the structures tested are entered in the tables with a plus '+' sign. A minus '-' sign denotes a non-target-like response, such as a participant pointing to a picture containing a grammatical contrast or different propositional content to the prompt. The number of errors i.e. the number of entries in each response pattern that violate the ideal model for each emergence pattern (Hatch, Lazaraton 1991), is shown in the right-hand column (no. errors). The numbers in the bottom line of the matrix count the *marginals* (Hatch, Lazaraton 1991). The first number is the total number of '+' instances, while the second one is the total number of '-' instances for that PT stage. We can see that the num-

ber of '+' instances tends to decrease as the structures get increasingly more difficult according to the PT hierarchy.

10 Results

Matrix 1 >5/6 correct n=42 (group 1)

	Stage 2						Stage 3	Stage 4				
No. samples	SVO	Gen	Neg	Plu	ProSbj	Poss	ProObj	AgrC		AgrV		No. errors
4	+						+	+		-		0
6	+						+	-		-		0
6	+						-	+		-		2
23	+						-	-		-		0
2	-						-	+		-		2
1	-						-	-		+		2
	39	3					10	32	12	30	1	31

Coefficient of reproducibility: 0.9523
Coefficient of scalability: 0.92683

Matrix 2 6/6 correct n=42 (group 1)

	Stage 2						Stage 3	Stage 4				
No. samples	SVO	Gen	Neg	Plu	ProSbj	Poss	ProObj	AgrC		AgrV		No. errors
1	+						+	+		-		0
2	+						+	-		-		0
2	+						-	+		-		2
26	+						-	-		-		0
1	-						-	+		-		2
10	-						-	-		-		0
	31	11					3	39	4	38	0	42

Coefficient of reproducibility: 0.97883
Coefficient of scalability: 0.96490

Matrix 3   >5/6 correct n=32 (group 2)

	Stage 2						Stage 3	Stage 4		
No. samples	SVO	Gen	Neg	Plu	ProSbj	Poss	ProObj	AgrC	AgrV	No. errors
1	+						+	+	-	0
1	+						-	+	+	1
8	+						+	-	-	0
10	+						-	+	-	2
9	+						-	-	-	0
1	-						+	-	-	1
2	-						-	-	-	0
	29 3						10 22	12 20	1 31	

Coefficient of reproducibility: 0.92361
Coefficient of scalability: 0.88211

Matrix 4   6/6 correct n=32 (group 2)

	Stage 2						Stage 3	Stage 4		
No. samples	SVO	Gen	Neg	Plu	ProSbj	Poss	ProObj	AgrC	AgrV	No. errors
2	+						+	+	-	0
4	+						-	+	-	2
1	+						+	-	-	0
15	+						-	-	-	0
2	-						+	-	-	2
8	-						-	-	-	0
	22 10						5 27	6 26	0 32	

Coefficient of reproducibility: 0.95833
Coefficient of scalability: 0.93369

To obtain the coefficient of scalability (c scal), a coefficient of reproducibility (c rep) is calculated to predict any given student's responses from his/her position within the table (Hatch, Lazaraton 1991). Hatch and Lazaraton (1991) set the threshold figure for this at 0.90. We see that the c reps for the first and second matrices for each pair indicate different degrees of reproducibility:

Matrix 1: **0.95238**, Matrix 2: **0.97883**, Matrix 3: **0.92361**, Matrix 4: **0.95833**

In both sample groups, the ≥5/6 emergence criterion (Matrix 1 and Matrix 3) yields valid, yet lower, reproducibility, than the 6/6 emergence criterion (Matrix 2 and Matrix 4).

The c scal, obtained using the c rep, needs to be above 0.60 (Hatch, Lazaraton 1991) to indicate that the data are truly scalable and unidimensional and can therefore support the PT hierarchy. The results are:

Matrix 1: **0.92683**, Matrix 2: **0.96490**, Matrix 3: **0.88211**, Matrix 4: **0.93369**

We see a similar pattern here, with the c scal for the ≥5/6 emergence criterion (Matrix 1 and Matrix 3) indicating a unidimensional scale, yet with reduced scalability, while scalability for the 6/6 category (Matrix 2 and Matrix 4) is more convincing.

11 Interpretation of Results

11.1 Adherence to PT Hierarchy

It appears that the more the responses display the target-like accuracy of 6/6 target-like responses, the more they adhere to the developmental trajectory predicted for the PT Stages 2-4. This may imply a qualitative leap once learners achieve the maximum 6/6 accuracy in receptive competence. The discrepancy between >5/6 and 6/6 accuracy is slightly greater in terms of scalability in the older sample of learners than the younger sample. Scalability thus appears optimal in older learners satisfying the maximum emergence criterion of 6/6.

11.2 The Role of Intra-Stage Variability

To examine the effect of intra-stage variation on overall scalability, the respective c reps for the original, non-collapsed scales were calculated for comparison with the collapsed scales, as shown below:

C rep - Matrix 1: **0.88359**, Matrix 2: **0.83598**, Matrix 3: **0.83333**, Matrix 4: 0.79862

C scal – Matrix 1: **0.30153**, Matrix 2: **0.24391**, Matrix 3: **0.29411**, Matrix 4: **0.33336** (see Appendix 1)

In each case, the c reps and c scals for these scales were not valid. Non-valid results were consistently evident for both 6/6 matrices (2 and 4), emphasising the fact that learners manifesting intra-stage variability may still progress systematically through the developmental stages and go on to produce an overall 6/6 emergence criteria score once matrices are adjusted for variability. Age may also

play a role for the presence of intra-stage variability, with this being more frequent in comparatively more advanced primary school learners, who entertain a wider variety of options for comprehension in their Hypothesis Space (see § 6.2). For older learners, scalability was thus greatly improved by allowing for intra-stage variation. Again, these data apply to receptive competence and may produce interesting comparisons with production data featuring intra-stage variability in comparable early-stage subjects, which is beyond the scope of the present study.

11.3 Applying the DMTH

German is typologically more similar to English than Italian in terms of overlapping morphosyntax, as well as phonology, something that may play a role unique to comprehension tasks. Specifically relating to the South Tyrol context, De Angelis (2015) found evidence that exposure to German L2 benefits English L3 development. However, the present study indicates that possible facilitative transfer from L2 German does not necessarily aid accuracy in the comprehension of the 3rd person possessive determiner (Poss) (his cat/her cat) – a Stage 2 structure, as seen in the non-collapsed matrix in Appendix 1. The differences in 'acquired' and 'not acquired' are more pronounced in the younger group 1 (20% and 80% compared with 42% and 58%). Italian possessive determiners agree with the gender of nouns they refer to, whereas, like English, German uses different determiners to indicate the gender of the possessor. It is likely that the learners are not yet at the developmental stage where they can process this information for English. This could result in a lower accuracy rate for comprehension and, especially for group 1, reduced opportunity for transfer from L2 German, thus supporting the DMTH.

A further structure that may display transfer effects is ProSbj. Unlike English and German, Italian is a pro drop, or null anaphora, language. Therefore, the 3rd person ProSbj ('He/She is singing'), which features the Subject Pronoun as an obligatory component, has a different structure to its licit pro drop Italian equivalent. This may place additional strain on learners' receptive skills, as they need to process forms typically absent in Italian. Regarding this structure, however, this study's data indicate that German L2 can confer a transfer advantage, as total percentages for 'acquired' and 'not acquired' for both groups were 69% and 31% respectively (see Appendix 1). Again, receptive competence in this structure was greater in group 2 (76% compared with 62% for 'acquired'). Increased accuracy at this Category Procedure level may be aided by L2 transfer in line with the DMTH. Another morphological structure potentially shedding light on processability-constrained transfer from German is the

Gen '-s' morpheme. Possession in Italian and sometimes in German is indicated with an 'of' construction as opposed to a morpheme. German, however, features an '-s' construction similar to that of English, which may be used after proper nouns (e.g. 'Roberts Hund'). In the present study, the first group displayed 75% 'acquired' versus 25% 'not acquired', and the second group 59% 'acquired' versus 41% 'not acquired' (see Appendix 1). Increased L2 transfer-related accuracy in older, more advanced, learners chimes with findings from Buttkewitz's 2018 investigation of facilitative L2 transfer in Turkish-German learners of English L3, whereby he found that DMTH-constrained transfer of the Gen '-s' morpheme occurs only from Stage 3 onwards. This is consistent with older learners being closer to Stage 3. However, the inflectional morpheme '-s' (Plu) belonging to the category stage (Stage 2) is one item that does not appear to lend itself to morphological transfer in either group. Overall, the participants produced a surprisingly high percentage of non-target-like responses (18%) to the prompt 'cats', selecting the contrasting singular form, 'cat' instead. Regular plural forms are generally one of the first morphemes to be acquired in L1 and L2 (Berko 1958; Brown 1973; Dulay, Burt 1973), as the addition of a suffix to denote the plural reflects a universal tendency in language typology (Håkansson 2019). German follows this tendency, yet Italian, where plural words are not necessarily longer than singular ones, does not. Di Biase and Kawaguchi (2002) emphasise the absence of morphological processing procedures in the formation of Italian plural forms and describe this form as lexical, being marked by alternating the end vowel of the word. The source of any non-facilitative transfer in this case may, in fact, be lexical or phonological, stemming from learners' exposure to the local variety of a German dialect (*Südtirolerisch*), whereby the singular 'cat' may be shortened to *Katz* rather than the standard German form *Katze*. This could cause listeners to process a singular and not a plural form. Lexical transfer is not claimed to have developmental repercussions (Buttkewitz 2018), and the DMTH is therefore not applicable when transfer is not of a morphosyntactic nature. Generally, Italian relies on morphology to mark relationships of constituents of sentences more than English, being less configurational. Thus, the absence of expected facilitative transfer enabled by clues provided by morphology could be a result of L1 Italian influence. German, on the other hand, is only somewhat configurational (Buttkewitz 2018), and would therefore play a less significant role in morphology-aided transfer but aid increased accuracy in word order and syntax.

12   Limitations

As outlined in the previous section, L1/L2 lexical and phonological influence may occur in picture selection tasks, which could potentially interfere with the internal validity of this type of instrument. Specifically concerning the ELIAS GT, Lenzing (2021) questions whether comprehension of prompts may be facilitated by non-linguistic information regarding processing of the Stage 2 possessive '-s' (Gen) prompt, indicating a more advanced developmental stage than is actually the case. This study uses zero plural nouns e.g. 'sheep', 'fish' to target copula (AgrC) and verb (AgrV) agreement, set at Stage 4 of the PT hierarchy, to avoid regular plural '-s' suffix interpretation, set at the earlier Stage 2; study participants may also not have received sufficient input in these irregular zero plural forms at the time of ELIAS GT. However, any expectation to hear the regular plural '-s' suffix clearly supports pattern-finding, PT-related theories of language acquisition and places them at least at Stage 2 in the PT hierarchy.

13   General Teaching Implications

There are possible teaching implications deriving from PT-related research, which stresses the need for teachers to deliver lessons that respect learners' developmental readiness and to wait until one structure has been acquired by the class before moving on to the next, both for production and reception. The findings of the present study on receptive competence tend to support the developmental trajectory that has been predicted by PT for production, with stronger PT compatibility for older compared with younger learners. The research-teaching interface is, in general, a much-discussed issue, with the explicitness and technical aspect of research-based theories tending to conflict with the more implicit and intuitive experience of teaching (Candlin, Mercer 2001). A strong interface position (Angelovska 2017), taking into account aspects of L1/L2 transfer, including DMTH-governed constraints, based on observation of receptive competence could be a useful approach.

13.1   Comprehension Versus Production

The advantages to understanding L3 learner progress through the PT stages for comprehension are increased when a learning-centred approach is taken to the initial phase of teaching, as comprehension is proposed to "firm up abstract linguistic structures" (Kumaravadivelu 2006, 140) that govern the setting up of mental representations in a non-native language.

13.2 PT-Compatible Methodology

Some fields of SLA have forged stronger links with pedagogy than others. Larsen-Freeman (2015) mentions that research on form-focused instruction (Long 1991), which is a widely accepted approach in L2 teaching contexts (Doughty, Williams 1998), has an impact on classroom practices. When taking a developmentally moderated approach with the aim of determining the items to target at any given point in time, form-focused instruction may successfully utilise findings from PT research, including the present ones for receptive competence. Di Biase (2002; 2008) calls this approach 'Developmentally Moderated Focus on Form' (DMFonF), whereby feedback is restricted to specific PT stage-targeted forms, and

> there is a focus on a specific (developmentally moderated) form for some components of the lesson, which is broadly communicative and meaning-based. (2020, 5)

Roos (in Kessler et al. 2016) particularly supports the use of DMFonF in early stage and mixed-level classrooms when target-group relevant and based on familiar vocabulary.

Task-Based Language Learning (TBLT) (Norris, Ortega 2000; Willis, Willis 2007) is similarly highly compatible with PT and the TH because it may be geared towards classes involving different stages of development. TBLT is classified as a Learner-Centered Method by Kumaravadivelu, which, despite its cyclical nature, remains "basically, linear and additive" (2006, 91) in line with the task-based approach notion that learning is controlled by internal processes involving transitions through developmental stages (Skehan 1996).

13.3 Teacher Awareness and Training

The idea of capitalising on children's natural learning processes and consequently redirecting teaching efforts is a promising one, especially for the multilingual classroom context. Findings from PT- and TH-related studies can benefit practitioners by lending them increased awareness of their students' interlanguage development and orientation, consequently predicting and classifying production of non-target-like language and adopting realistic expectations of achievement at a given time (Pienemann 1989). Some researchers in applied linguistics stress the need for teachers to take morphology more seriously (Bauer, Nation 2020). Understanding of and timely attention to the learner strategies of avoidance and omission regarding features said to be variational according to the PT schedule can be beneficial, not to mention have a preventive function in terms of future progress through the stages.

The present study points towards a hierarchy in the accumulation of receptive competence that may be utilised to improve learning outcomes, such as arranging the order of teaching reception of certain morphological items such as 3rd person singular (AgrV) and possessive '-s' (Gen) in a TH-compatible sequence. If this is not possible due to curriculum and textbook constraints, TH-aware teachers will be aware of the reasons why learners appear to 'lag behind' or even acquire an item earlier than expected in their comprehension. As research suggests that the psycholinguistic constraints involved in the L3 acquisition process differ from those typically found in the L2 classroom, increased sensitivity towards transfer effects such as those proposed by the DMTH would be a bonus. Rothman et al. (2019), in fact, warn against teaching L2 and L3 learners in the same way.

13.4 The Multilingual Teaching Context

Therefore, in the light of recent research on multilingualism, a rethinking of the classroom implications of SLA theories seems overdue. Angelovska (2017) expresses the need for recent findings in TLA research to be utilised and states that plausible implications for teaching are still on the 'to-do' list of many researchers. She also stresses the importance of understanding the origin of non-facilitative transfer:

> in the field of Instructed Third Language Acquisition, teachers are left alone not knowing how to predict which transfer phenomena may occur, how to overcome them and how to raise their learner's metalinguistic awareness of differences in their language repertoires that cause problems in acquisition. (2017, 316)

Though the present study is purely descriptive, it could prompt third language teachers operating in contexts with similar language constellations to reflect on the architecture of the language processors of their multilingual students and put any pedagogically-attuned predictions into practice.

14 Conclusions and Future Research

The present research study attempts to investigate the dynamics of receptive grammatical development in early child multilingualism from a PT perspective and to promote understanding of the nature of L1/L2 to L3 transfer through the lens of the DMTH. The present findings on receptive competence indicate an overlap between production and reception processing, as existing research indicates

that the former follows PT developmental schedules, and the latter data of this study typically support the PT hierarchy, particularly when maximum target-like accuracy is achieved. There is also evidence to suggest a role for the DMTH in transfer of morphosyntactic structures for reception, which does not appear to obtain significantly before Stage 3. Further research would be needed to examine the factors involved in the acquisition of variational features, which are said to benefit more than developmental features from instruction (Ellis 2008), with consequences for teaching contexts, and to elaborate guidelines for their identification, as well as testing the DMTH for other multilingual settings (Buttkewitz 2018). Regarding receptive morphosyntactic competence, alternative methods for observing comprehension of certain structures such as subject-verb agreement, along with the formulation of explicit definitions of emergence versus acquisition for receptive competence, and the devising of specific tasks to target online processing would be of additional value.

Appendix 1

Matrix 1   ≥5/6 correct n=42 (group 1)

			Stage 2				Stage 3	Stage 4		
No. samples	SVO	Gen	Neg	Plu	ProSbj	Poss	ProObj	AgrC	AgrV	No. errors
2	+	+	+	+	+	+	+	+	-	0
2	+	+	+	+	+	+	+	-	-	0
1	+	+	+	+	-	+	+	+	-	2
2	+	+	+	+	+	+	-	+	-	2
1	+	+	+	+	+	-	-	+	-	2
1	+	-	+	+	+	-	+	+	-	4
1	+	+	+	-	+	+	+	-	-	2
4	+	+	+	+	+	+	-	-	-	0
2	+	+	+	+	-	-	+	-	-	2
1	+	+	+	+	-	-	-	+	-	2
1	+	-	+	+	+	-	+	-	-	2
10	+	+	+	+	+	-	-	-	-	0
2	-	+	+	+	+	-	-	+	-	2
2	+	+	+	+	-	-	-	-	-	0
3	+	-	+	+	+	-	-	-	-	2
1	+	+	+	+	-	-	-	-	-	0
2	-	+	+	+	+	-	-	-	-	2
1	+	+	+	-	-	-	-	-	-	0
1	+	-	+	-	-	-	-	+	-	2
1	+	+	-	-	-	-	-	-	+	2
1	-	-	+	+	-	-	-	+	-	4
MM	37	35	41	38	31	30	32	30	41	

C Rep = 0.88359
C Scal = 0.30153

Matrix 2 6/6 correct n=42 (group 1)

| No. samples | Stage 2 | | | | | | Stage 3 | Stage 4 | | No. errors |
	SVO	Gen	Neg	Plu	ProSbj	Poss	ProObj	AgrC	AgrV	
(1)	+	+	+	+	-	+	+	+	-	2
1	+	+	+	+	+	+	+	-	-	0
1	+	+	+	+	+	+	-	-	-	0
(1)	-	+	+	+	+	+	-	+	-	2
7	+	+	+	+	+	-	-	-	-	0
(1)	+	+	+	+	-	-	-	+	-	2
4	+	+	+	+	-	-	-	-	-	0
1	+	-	+	+	+	-	-	-	-	2
1	-	+	+	+	-	+	-	-	-	2
4	-	+	+	+	+	-	-	-	-	2
(1)	-	-	+	+	+	-	+	-	-	4
2	+	-	+	+	-	-	-	-	-	2
1	+	+	-	-	+	-	-	-	-	2
(1)	+	-	+	-	-	-	-	+	-	2
2	+	+	-	+	-	-	-	-	-	2
1	-	+	+	+	-	-	-	-	-	2
(1)	-	-	+	+	+	-	-	-	-	2
(1)	-	+	+	-	+	-	-	-	-	2
1	-	+	-	+	-	-	-	-	-	2
2	-	-	+	-	+	-	-	-	-	4
1	+	-	-	+	-	-	-	-	-	2
4	-	-	+	-	-	-	-	-	-	2
1	-	-	-	+	-	-	-	-	-	2
1	+	-	-	-	-	-	-	-	-	0
MM	24	28	35	32	21	37	39	38	42	

C Rep = 0.83598
C Scal = 0.24391

Matrix 3   ≥5/6 correct n=32 (group 2)

No. samples	SVO	Gen	Neg	Plu	ProSbj	Poss	ProObj	AgrC	AgrV	No. errors
			Stage 2				Stage 3	Stage 4		
1	+	+	+	+	+	+	+	+	-	0
7	+	+	+	+	+	+	+	-	-	0
2	+	+	+	+	+	+	-	+	-	2
(1)	+	+	+	-	+	+	-	+	+	3
(1)	+	+	+	+	+	-	-	+	-	2
1	+	+	+	+	+	+	-	-	-	0
(2)	+	+	+	+	+	-	-	-	-	0
1	+	-	+	+	+	+	-	-	-	2
(6)	+	-	+	+	+	-	-	+	-	2
(1)	-	+	+	+	+	-	+	-	-	2
1	+	+	+	+	-	-	-	-	-	0
(1)	+	-	+	+	+	-	-	-	-	2
(1)	+	-	+	+	-	-	-	+	-	2
1	-	-	+	+	+	-	-	-	-	4
(1)	+	-	-	-	-	+	+	-	-	4
1	-	-	-	+	+	+	-	-	-	6
1	+	+	-	-	+	-	-	-	-	2
1	+	+	-	-	-	-	-	-	-	0
1	-	-	+	-	+	-	-	-	-	4
MM	28	19	28	27	28	17	22	20	31	

C Rep = 0.83333
C Scal = 0.29411

Matrix 4   6/6 correct n=32 (group 2)

No. samples	Stage 2						Stage 3	Stage 4		No. errors
	SVO	Gen	Neg	Plu	ProSbj	Poss	ProObj	AgrC	AgrV	
2	+	+	+	+	+	+	+	+	-	0
(2)	+	+	+	+	+	+	-	+	-	2
3	+	+	+	+	+	+	-	-	-	0
(1)	-	+	+	+	+	+	-	+	-	2
1	+	+	+	+	+	-	-	-	-	0
(1)	-	+	+	+	+	-	-	+	-	2
5	-	+	+	+	+	-	-	-	-	2
(1)	-	-	+	+	+	-	+	-	-	4
1	-	+	+	+	+	-	-	-	-	2
1	+	-	+	+	+	-	-	-	-	2
1	+	+	+	-	-	+	-	-	-	2
(1)	+	-	+	+	-	-	-	-	-	2
1	+	-	-	-	-	+	+	-	-	4
1	+	+	-	-	+	-	-	-	-	2
(1)	+	-	-	+	-	-	+	-	-	4
1	-	-	+	+	+	-	-	-	-	4
1	+	-	-	+	-	-	-	-	-	2
1	-	-	+	+	-	-	-	-	-	4
1	-	-	-	+	+	-	-	-	-	4
1	-	+	+	-	-	-	-	-	-	2
1	-	-	-	+	-	-	-	-	-	2
1	+	-	-	-	-	-	-	-	-	0
2	-	-	-	-	-	-	-	-	-	0
MM	16	19	23	25	21	22	27	26	32	

C Rep = 0.79862
C Scal = 0.33336

Appendix 2

Prompts: the girl is feeding Tom; the girl is feeding Tom's dog; the girl is feeding Tom's dog (distractor: everybody in the picture, no action)

Abbreviations

ELIAS GT	Early Language and Intercultural Studies Grammar Test
L2	Second Language
L3	Third Language
PT	Processability Theory
SLA	Second Language Acquisition
TH	Teachability Hypothesis
TLA	Third Language Acquisition

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