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Learning Patterns in the Acquisition of Maltese as a Foreign Language by adults

Jacqueline Żammit
University of Malta
jacqueline.zammit@um.edu.mt

Abstract : Despite increased interest in learning Maltese as a foreign language (MFL), there is a lack of research and large-scale studies on the acquisition of MFL. The research question of this study is: *Can a pattern be observed over time in the acquisition of verbal tense/aspect by adult learners of Maltese as a foreign language?*
The aim of my research is to understand what is going on in a learner's mind when acquiring Maltese verbal tense and aspect as a foreign language (FL). The study is guided by Chaos/Complexity theory (C/CT), which focuses on the non-linear learning curve, the initial conditions of the butterfly effect and fractal patterns in language learning, and considers learning to be unpredictable, chaotic and complex (Larsen-Freeman, 1987; 2011). My research is based on the epistemological approach of pragmatism and includes both cognitive and sociocultural perspectives of second language acquisition (SLA). A longitudinal research design and a mixed method approach focusing on methodological triangulation are adopted, as they are the most suitable for answering my research question.
From a target population of 39, with a 95% confidence interval and a margin of error of 4%, a convenience sample of thirty-five adult participants attending three Lifelong Learning Centres to learn Maltese as a foreign language participated in this study from March 2016 until May 2017. Structured Timed Grammaticality Judgment Tests (TGJTs) and verb conjugation tasks were used to investigate the learning curve of the students, and hence to explore any learning patterns over time. The results indicated that all participants exhibited a non-linear learning pattern, except for three learners who exhibited an ogive learning curve. The main learning pattern was an increase in learning (vertical axis) over time (horizontal axis). The findings are consistent with Chaos/Complexity theory, which postulates that learning is complex, chaotic and unpredictable and, as in nature, it is impossible to find a true, logical pattern in the foreign language learning process.

Keywords: Interlanguage, Chaos/Complexity theory (C/CT), non-linear learning curves, butterfly effect, fractal patterns.

Introduction

Since Malta's membership in the European Union (EU) in 2004 and the implementation of the Free Movement of European Nationals and their Family Members Order (the "Order"), a large number of economic migrants have been seeking residence in Malta (Thomas, 2006; Lutterbeck, 2009; Micallef Cann, 2013; Barbaro-Sant, 2018). The thousands of migrants searching for jobs in a booming economy are joined by several others in search of international protection. This situation has created a demand for Maltese as a Foreign Language (MFL). Due to this demand, the Lifelong Learning Centre in Malta offers two MFL programmes: Level 1 (Elementary and Pre-Intermediate) and Level 2 (Intermediate) which are one and two year programmes respectively. Currently, some English language schools are also teaching MFL.

Despite the increased interest in MFL, there is a lack of research and large-scale studies in this area. Given that second language acquisition (SLA) is influenced by a variety of factors (VanPatten, 2004; Cook, 1993; Chomsky, 1995), there is a need of incorporating those factors in the current research and thus the reason for selecting C/CT as the conceptual framework. Unlike most of the traditional learning theories which explore SLA either from a cognitive perspective (Duff, 2002; OFSTED (OFfice for STandards in EDucation), 2012; McLeod, 2015) or from a socio-cultural point of view (Guilloteaux & Dörnyei, 2008; Lantolf, 2011), C/CT explores SLA from both the cognitive and the socio-cultural perspectives so that a more comprehensive, holistic, valid and reliable picture of the factors involved in SLA can be drawn (Larsen-Freeman, 1987, 2011, 2018; Hiver & Al-Hoorie, 2016; Blommaert , 2016; Pinner, 2016).

Most of the traditional learning theories treat SLA as a fixed, linear, cause and effect phenomenon (Carroll, 2007; Jaber, 2011) while some theories such as C/CT consider L2 learning as a nonlinear, complex, and dynamic system evolving and changing in an unpredictable manner through the dynamics of language in social interaction (Larsen-Freeman, 2017; Al-Hoorie, 2016, Blommaert, 2016; Pinner, 2016). The focus of the present study is on a selection of grammatical items that promises to provide important insights on MFL inflectional verbal system, given the absence of any research to build on; apart from the interesting analysis of the interlanguage of adult foreign learners of Maltese which was done by Camilleri (1988) and Camilleri Grima

(2015). The present study sheds light on adults learning Maltese as a foreign language, with regard to verbal tense and aspect. The primary research question addressed is: *Can a pattern be observed over time in the acquisition of verbal tense/aspect by adult learners of Maltese as a foreign language?*

Foreign versus Second Language

It is important to note that when referring to the literature, I am going to use Second Language Acquisition (SLA) and Second Language (L2). These two terms are most frequently used in the field's literature (Berger, E. & S. P. Doehler, 2018; Larsen-Freeman, 2018; Bymes, 2018; Costa, Pickering & Sorace, 2008; Cook, 2016; Nordquist, 2017; Matsuda et al., 2017; Snape & Kupish, 2017), particularly in the context of a foreign learner who is learning a language that is spoken in the country where s/he is staying in (Benson and Voller, 2014). When I am referring to Maltese, I am going to use the term 'Maltese as a foreign language' (MFL) since all the learners in the study speak at least one other language and English, and also because Maltese co-exists with English as an official language (Costa, 2018; Rosner et al., 2012).

Theoretical Framework

A learning curve is a graph which represents how an increase in learning (measured on the vertical axis) comes from greater experience or time spent in learning (the horizontal axis); or how the more a learner does something, the better they get at it. In fact, as a learner performs a task repetitively, the likelihood of performing well on the same task will increase. Aird (2017) affirms that most students learn and improve over time and that a learning curve represents the rate at which a learner can learn a concept over a period of time.

A variety of learning curves exist depending on the information being relayed and the most common ones are related to assistance learning, error learning, and predicated learning. An assistance learning curve is an indication of the help or hints accorded to an individual for a given task or opportunity and it mostly considers that an error of 1.3 times occurs, especially when attempting an activity for the first time (Kalonji, 2018). Assistive learning curve helps in gauging experience by tracking progress. An error learning curve depicts the assistance offered in percentages for each respondent in the first attempt (Abernathy & Wayne, 1974). The predicted learning curve quantifies the proficiency and difficulty component of the taught elements (Anzanello &

Fogliatto, 2011). In light of the forgoing, human attitude needs to be positive for a strong correlation between a learning curve and experience to occur and thus maintaining a linear curve (Carroll, 2007; Anzanello & Fogliatto, 2011).

Proponents of a linear curve postulate that the traditional approach to learning follows a linear learning system, in that an individual should initially understand a previous topic before proceeding to the next, and in every task or test, the learner scores higher than in the previous one (Carroll, 2007). According to Jaber (2011), a second language textbook is organised in such a manner that topics only make sense if tackled one after the other and, as a result, learning will inevitably produce a linear curve.

Opponents of the linear learning curve stipulate that people either use naturism or empiricism in understanding concepts (Lapré & Nembhard, 2011) and hence the learning curve becomes non-linear. Naturism is inborn, where an individual acquires their first language as a result of the place they are born and nurtured. Empiricism emphasises that scientific knowledge is related to experiments and experience and thus the language in empiricism is acquired through defined means that must be followed to the dot. It is indeed acknowledged that non-linear curves exist through a series of subconscious networks connected through dots and nodes within the human intellect (Flagg, 2014).

A non-linear curve has four phases, namely step progress, plateau, ogive, and decline, depending on the relationship between learning and experience (Kalonji, 2018; Lapré & Nembhard, 2011). Kendall (2016) claims that a step progress curve is an indication that the subject is difficult to grasp, but with time, it becomes comprehensible. The plateau phase is an indication of temporality in the comprehension process and it shows that the concentration span of the learner is at maximum and no further knowledge absorption can occur (Kalonji, 2018). An ogive curve is an accumulative frequency graph which shows an addition of the percentages. Lapré and Nembhard (2011) claim that ideally, a cumulative frequency graph is similar to a gradual curve, however, it can include a series of points when the learner does not depict an increase in learning with time. The decline phase shows a reduction in knowledge absorption with an increase in experience or time dedicated to the process of learning and it occurs when a learner reaches the saturation point, but the teacher continues with the lesson or topic, and the learner will neither comprehend nor remember any element taught during that period (Kalonji,

2018). Since the linear curve is based on the traditional approaches of teaching, the current research's conceptual framework is C/CT which focuses on the non-linear learning curve.

The Conceptual Framework

C/CT is gaining increasing popularity in the modern world due to its high levels of technical innovation, dynamism and interconnectivity (Bymes, 2018; Berger & Doehler, 2018; Larsen-Freeman, 2018). It is relevant for analysing the patterns of progress in such fields as SLA, through incorporating a multitude of relevant factors into the constructed theoretical models (Larsen-Freeman, 2017). Larsen-Freeman (1997) identifies the following characteristics of C/CT: dynamic, complex, non-linear, chaotic, unpredictable, sensitive to initial conditions, open, self-organising, feedback sensitive, adaptive, strange attractor, and fractal pattern. Table 1 describes each characteristic.

The sociocognitive view of SLA should follow three principles namely: the inseparability principle, the learning-is-adaptive principle, and the alignment principle (Atkinson, 2010). The inseparability principle, declares that the social and the cognitive aspects of SLA are inseparable, and any attempt to separate them for the sake of a cleaner, less complex analysis is to mainly denature them both. The learner's cognition (knowledge) is formed through social interaction (Hutchins, 1995). According to Gee (2013), language and meaning exist partially in the individual's head and partially out in the world and thus meaning and meaning making are simultaneously social and cognitive (Gee, 2013). The Learning-is-adaptive principle declares that cognition (knowledge) exists to move and lead adaptive action which is the device through which individuals and groups adapt to their eco-social environment (Atkinson, 2010). Schmidt's (1983) stipulated that interaction and acculturation influences SLA and that an individual does not need to have grammatically perfect English to communicate. The Alignment Principle declares that people align to each other, their cognitive affordances, and their eco-social world so that they carry out a joint action (Atkinson, 2012).

C/CT demonstrates that learning is non-linear under two approaches - sociocognition and emergentism.

Table 1: Characteristics of C/CT

Characteristics	**Description**
Dynamic	The learning process keeps on changing as time changes.
Complex	Composed of different parts that act and interact throughout.
Nonlinear	Learning is not a *straight-line*. We learn in a random way based on declines, plateaus and progress.
Chaotic	Existence of a deep structure that is coherent within a randomness that is evident.
Unpredictable	The future cannot be postulated.
Sensitive to initial conditions	A very little change has a paramount impact on the process of learning at a later stage.
Open	Easier movement of information inside and outside.
Self-Organizing	As the different components interact with each other, a pattern is formed.
Feedback Sensitive	Feedback is integrated into an individual's behaviour.
Adaptive means	The optimum effect is determined by the learner's adjustment to the environment where L2 is spoken.
Strange Attractor	The displayed pattern is universal but the details cannot be predicted.
Fractal	Existence of a repetitive pattern at a variety of scales.

The Emergentism view of SLA puts emphasis on the complex and dynamic nature of language development (Larsen-Freeman, 1997). Compartmentalised, dichotomised SLA, and metaphors are many times made for helping the researcher, but on the other hand they may really simplify what occurs (Kramsch, 2002; Larsen-Freeman, 1997). This emergentist concept of SLA challenges the cognitive SLA theorists and researchers who portray SLA occurring in a systematic way (Larsen-Freeman, 1997). According to McAndrew (1997), nobody can discover any reality without chaos because

chaos is characterised by a sensitive dependence on initial conditions (butterfly effect), in which small insignificant changes can lead to exponential learning, and it has strange attractors which is an indication of no unpredictable characteristics.

Methodology

This study was based on the pragmatism epistemology approach. The pragmatic worldview embraces a variety of ideas and approaches while acknowledging the significance of both the subjective and objective approaches (Teddie & Tashakkori, 2012). Pragmatism was chosen because according to pragmatism, the research question is the most important determinant of the research philosophy and it can combine both, positivist and constructivism positions in a single research (Rescher, 2001). Pragmatism emphasises that knowledge is created through reflection and experience, and is therefore the result of inductive and deductive reasoning (Bazeley, 2013).

The design adopted by the research was the longitudinal research design, and included the mixed method approach with a focus on methodological triangulation. A longitudinal research involves the repeated collection of data over a period of time (Ortega & Iberri-Shea, 2005). The longitudinal design is justified by the importance given to empirical studies adopting a longitudinal perspective in adult's SLA (Ortega & Iberri-Shea, 2005) and by the assertion by Bardovi-Harlig (2000) that longitudinal study helps the researcher to establish a developmental pattern of the learner's acquisition of tense/aspect or the implications of change/improvement in learning over time (Saldaña, 2003; Menard, 2002).

The mixed method approach entailed the collection of both quantitative and qualitative data in this study. A mixed method approach was selected because it allows the researcher to simultaneously answer exploratory and confirmatory research questions, thus facilitating both the generation and the confirmation of a theory (Teddlie & Tashakkori, 2003). Methodological triangulation was the selected variant of the mixed method. Triangulation is the use of two or more methods of data collection in the study of some aspect of human behaviour (Cohen et al., 2000). Methodological triangulation was selected because of the awareness that using a single method in collecting data has many limitations and it might be insufficient to provide adequate, valid, reliable and accurate research results. Triangulation helps to "get the best of both worlds": quantitative and qualitative reliability and validity

(Guilloteaux & Dörnyei, 2008; Kyriacou & Zhu, 2008; Ryan, 2009; Chang, 2002; Busse & Williams, 2010).

This study was conducted at three Lifelong Learning Centres from March 2016 till May 2017. A sample of 35 participants was selected from a target population of 39 (because 4 participants could no longer take part in the study for various reasons) at a 95% confidence interval and a margin error of 4%. The inclusion criteria were: aged 18 or over; some knowledge of English as a first language or as a foreign language; post puberty age at first exposure to Maltese; and must have passed Maltese Level 1 intensive course (Elementary and Pre-Intermediate) A1 and A2 (MFL1). Participation was voluntary and a participant had to provide an informed consent prior to participating in the research. The research was approved by University Research Ethics Committee (UREC) and Faculty Research Ethics Committee (FREC).

To answer the above research question, the structured Timed Grammaticality Judgment Tests (TGJTs) and verb conjugation tasks (VCs) were used to investigate the learning curve of the students and hence to explore any learning patterns over time. TGJT involved judging 40 sentences in 20 minutes on whether the sentences were grammatically correct or incorrect, to obtain insight into their implicit knowledge (Sorace, 1996). During stimulation recall, the participants gave their reason behind their judgement. Schütze (2016) believes that subjects should be asked why they judged a sentence the way they did. Hedgcock (1993) also proposed asking learners to mark why they judged ungrammatical items, to obtain explicit knowledge (Loewen, 2009).

Verb conjugation tasks consisted of ten test items where the participants were asked to conjugate the *Mamma* (base form of the verb) according to the context of the sentence. Verb conjugation tasks are aimed at examining the explicit knowledge of the learners (Macrory & Stone, 2000) of grammatical forms and meanings (Purpura, 2004).

The participants were tested six times during a period of fifteen months at 2-3-5 month intervals from March 2016 till May 2017. The validity and reliability of TGJTs and VC tasks were established via a pilot study. The pilot study consisted of 13 foreign students of Maltese who attended my colleague's private lessons in MFL. In addition, validity and reliability of both

grammar tests, TGJT and VC were ensured by the 15 native Maltese speakers by checking agreement on grammatical judgement with each other and with me (the researcher). The statistics for Grammaticality Judgment Test and the verb conjugation task were analysed by first plotting a one-way ANOVA graph that shows the development of each learner's score at six different points of data collection.

Results

Six learning curves concerning Timed Grammaticality Judgment Test (TGJT) and Verb Conjugation task (VC) results as well as GeoGebra sketches were used to describe the learning pattern of long-term improvement of the participants.

Learning curve 1

Learning Curve 1 was the most common and it was experienced by six participants out of thirty-five. The participants provided several reasons which can be used to explain the non-linearity of learning curve 1, in which as the general trend in figure 1 shows, at first they experienced a slight progress, then a slight decline, and then an overall progress.

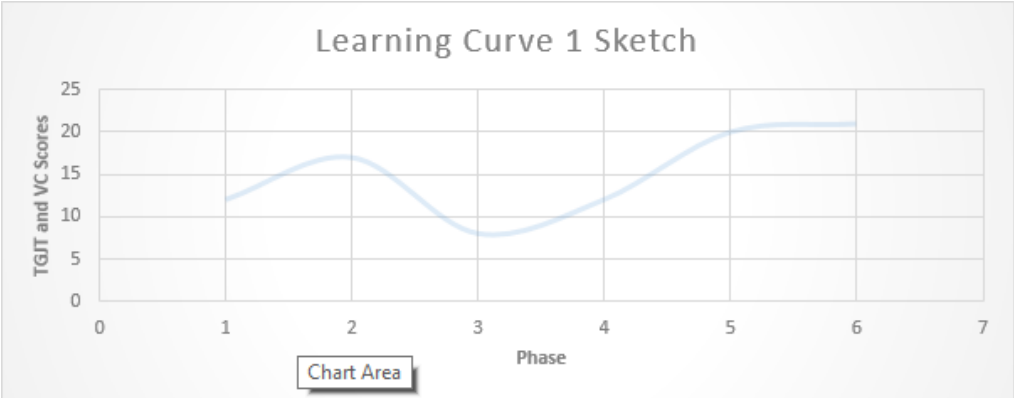

Figure 1: The Trend of learning curve 1

The reasons which were given by the participants for their improved performance were: being an extrovert, talking in Maltese with Maltese native speakers, being an introvert and learning via reading, being motivated to learn Maltese, listening to Maltese via the broadcasting media such as the radio, reading with a view to understanding Maltese; a liking for traditional

methods of instruction, use of auditory method of learning, never giving up on learning Maltese; and striving to speak in Maltese.

On the other hand, the participants' reasons for their lower scores in October 2016 were: lack of exposure to Maltese as a result of health matters, travelling during summer when the learning centres are not opened, 'cramming' Maltese with a purpose of passing exams; not being successful in learning Maltese due to memory problems, inadequate time to study Maltese, the native speakers not correcting the MFL learners when making mistakes, preference for reading as a study method. Some other participants were not able to provide a reason for their lower performance over time.

Three variations of Learning Curve 1 were observed. Variation 1 of Learning Curve 1 was experienced by two participants who experienced a learning plateau between January 2017 and March 2017. Variation 2 of learning curve 1 was experienced by three participants as they scored lower in October 2016, and two of them experienced a plateau. Variation 3 of learning curve 1 was experienced by two participants, who in the beginning, between TGJT1 and TGJT2 and between VC1 and VC2, made a slight progress in their tests.

Learning curve 2

Four participants out of thirty-five experienced learning curve 2. As Figure 2 shows, the trend of learning curve 2 was an initial decline, followed by a slight increase, then a slight decline and finally a significant increase.

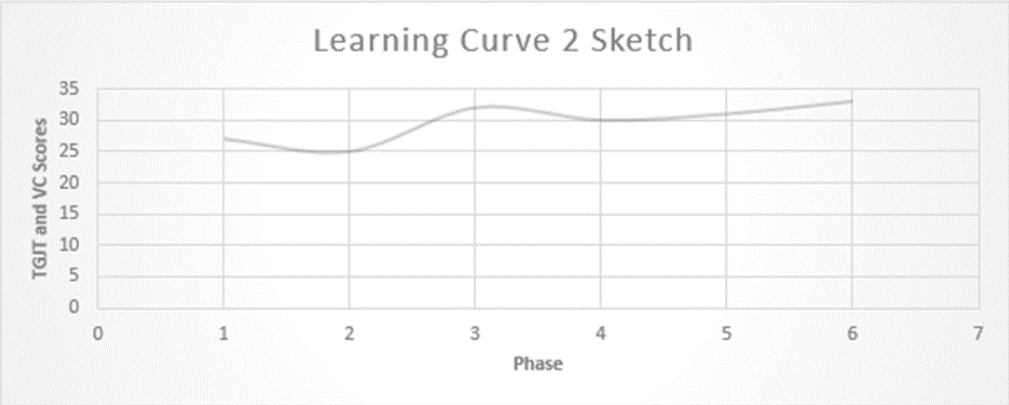

Figure 2: The Trend of learning curve 2

The reasons given for a decline in performance included: frustration due to lack of progress; lack of exposure to Maltese due to traveling;

disappointments when they could not pronounce the language like a native speaker; exam related anxiety; variation in Maltese and the participant's first language (L1); a dislike for the traditional teaching methods; preference of visual method of learning; lack of help from a Maltese spouse; and not being successful when making an effort to speak Maltese. On the other hand, the reasons given by the participants for their progress were; speaking Maltese to friends and relatives who are Maltese native speakers; finding time to study Maltese in spite of several pressures; preference for a visual method of learning, and attending tuition apart from the usual evening classes.

Two variations were experienced related to learning curve 2. Variation 1 of Learning Curve 2 was experienced by two participants who experienced a slight decline in the beginning (i.e. TGJT1 and 2 and VC 1 and 2), and a gradual progress thereafter. Variation 2 of Learning Curve 2 was experienced by one participant whose performance was noted in TGJT5 as a slight drop by only one mark from her TGJT4.

Learning curve 3

Two participants experienced learning curve 3. As seen in Figure 3, the participants experienced a slight decline in the beginning and then an overall increase.

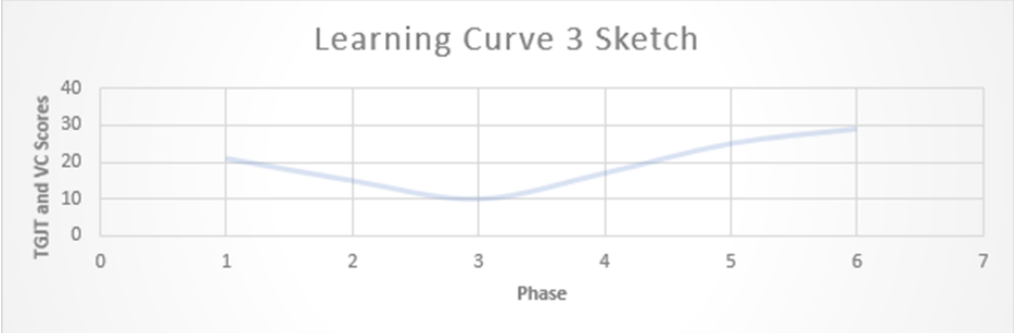

Figure 3: The Trend of learning curve 3

The reasons given for the decline in performance were: not being confident to talk in Maltese; interference between Maltese and their L1; preference for an auditory method of learning; doubting their Maltese knowledge while revising for May's learning centre examination; exam related anxiety; the existing variation between Maltese and their L1; a preference for the traditional method of teaching; reduced exposure to Maltese due to traveling;

lack of drive to study Maltese; and the Maltese people being too polite to correct MFL learners' mistakes during a conversation. Learning curve 3 had one variation which was experienced by only one participant. The only difference is that this participant obtained lower marks in TGJT5 as compared to those obtained in TGJT4 in October 2016.

Learning curve 4

One participant experienced learning curve 4. As shown in Figure 4, the participant experienced a plateau in the beginning, followed by a slight decline, a steep increase, a slight decline and a steep increase.

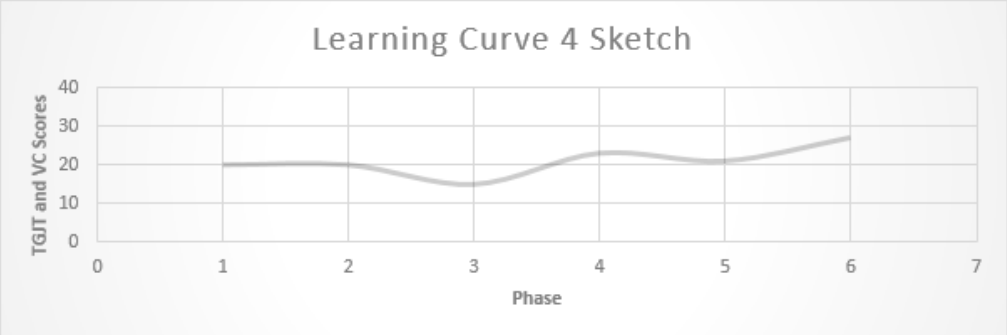

Figure 4: The Trend of learning curve 4

The reason for the participant's plateau from January till May 2017 were: not liking the traditional method of teaching and finding it hard to be fluent in Maltese. Learning Curve 4 had one variation which was experienced by one participant, in which the participant scored higher in TGJT5 as compared to TGJT4.

Learning curve 5

Three participants out of thirty-five experienced learning curve 5 for their TGJTs and VCs. Figure 5 shows that at first, this Learning Curve 5 group of participants obtained lower scores, then a steep increase, followed by a slight decrease, a moderate increase and a slight decrease in both TGJT and VC.

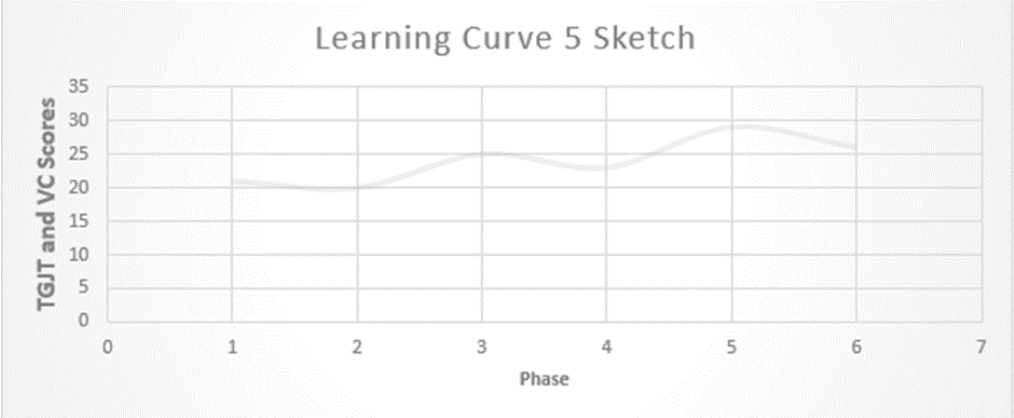

Figure 5: The Trend of learning curve 5

The participants' reasons for their decline in performance were: difficulty to formulate thoughts in Maltese; memory problems; lack of similarity between Maltese and their L1; preference for the traditional teaching method; the use of grammatically incorrect words in social media; lacking a sense of either grammar or punctuation; not being able to speak Maltese due to being shy as well as having an introvert personality; and setting a high goal leading to lack of patience when the Maltese verbal system becomes difficult to understand.

The reasons for progress in Learning curve 5 group were: preference for an auditory method of learning; making efforts to speak in Maltese as it is imperative for social interactions, depending on which village the MFL learner lived in; and by concentrating on the meaning of those words that MFL learners did not know even though they understood the text.

Learning curve 6

Three participants experienced learning curve 6 in the study's quantitative tasks. As Figure 6 shows, this group made a continuous progress in their learning performance from the start. Hence, they were the only ones who experienced an ogive learning curve. In an ogive learning curve, the learner is always obtaining higher marks or hitting a learning plateau but not experiencing any decline.

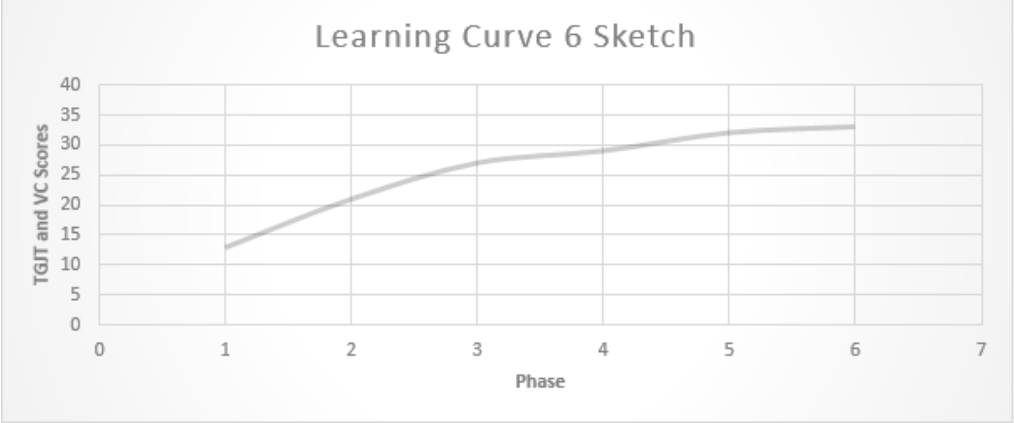

Figure 6: The Trend of learning curve 6

The participants' reasons for their progress in MFL were: the existing similarities between Maltese and their L1; feeling confident to speak in Maltese; preferring to study Maltese via writing; and learning from fishermen who are native Maltese speakers, preferring the traditional teaching method; and attending private teaching sessions on a one-to-one basis in addition to the usual evening classes.

Discussion

The research question aimed at establishing whether a pattern could be observed over time in the acquisition of verbal tense/aspect in adult MFL learners. Based on the learning curves shown above, it was clear that a pattern could be obtained over time during the study. The main learning pattern was an increase of learning (vertical axis) against time (horizontal axis) (Aird, 2017). However, the curves were not linear (except for three ogive learning curves which did not show any decline). This finding negates the belief of linearity, at least, not for the majority of learners, as has traditionally been believed, until it was disputed by Chaos/Complex theory.

All the six learning curves demonstrated that learning is non-linear because the scores did not increase consistently over time although the participants continued attending lessons and studying Maltese. This indicates that second language learning outcomes do not directly depend on the classroom and other input. Several Chaos/complexity characteristics could be seen in the learning curves. Learning curve 1 was evidently *dynamic* since the performance of the participants kept on changing with time. Learning curve 2 displayed the characteristics of *open* and *self-organising* since each participant

had a different and distinct score, which is an indication that information can flow in and out and that a pattern can develop as the different learning components interact. The fact that learning is *unpredictable* and *complex* was observed in learning curve 3 since these participants experienced progress and decline in their performance thus it was difficult to not only determine the various parts contributing to the performance but also to oversee the future state. The *adaptive* and *feedback sensitive* characteristics were evident in learning curve 4 because the participants' performance kept on changing and was influenced by a dislike of the teacher's traditional method of teaching and difficulty in reaching fluency and the two reasons can be classified as the surrounding environment which could also have an impact on feedback. A *fractal* and *chaotic* pattern was revealed in learning curve 5 since there was a repetition of increase and decrease performance and apparent randomness in the pattern. Learning curve 6 portray the characteristics of *sensitive to initial condition* and *strange attractor* because the performance kept on improving since the start of the tests and yet it could still not be predicted.

Impressively, every learner scored a higher mark in his/her last quantitative tasks in May 2017 as compared to his/her first score on both quantitative tasks in March 2016. It was interesting to observe that most of the time, the participants scored in the same way in the timed grammaticality judgment tests as they scored in the verb conjugation tasks. This is one of the defining features of the fractal concept of chaos/complexity theory, a feature of similarity between variables. Fractal pattern is evident in the below Figure 7 since for instance, MFL learners who scored high on VC turned to score high on TGJT while learners who scored low on VC turned to score low on TGJT.

The test scores show the reliability of C/CT to explain the process of understanding second language acquisition. This implies that the facilitation of the process of learning Maltese verbs was more inclined towards a repetitive pattern of learning styles and capabilities (Larsen-Freeman, 2011; Finch, 2004). The results support the fact that when the learners got a concept right, they generally did well in both the TGJT and VC when this concept was examined. This is evident in Figure 7 which shows a positive correlation between TGJT and VC scores and it can hence be concluded that a fractal pattern exists.

On the other hand, a mistake in the perception of a word in Maltese such as '*għadda*' ('passed') showed mistaken scores among all learners. The fractals in

the learning curves exist due to the familiarity of dimensions in the learning process. The fractals in the learning curves also show chaotic movements due to the participants' variations and the strange attractor; and hence unpredictability. In fact, not all participants experienced fractal patterns in both TGJTs and VCs. There were participants who sometimes experienced fractal patterns in both tests within a particular month but not during another month. This also supports the view that learning is complex, chaotic and unpredictable, and as in nature, it is impossible to find a real logical pattern in the learning process.

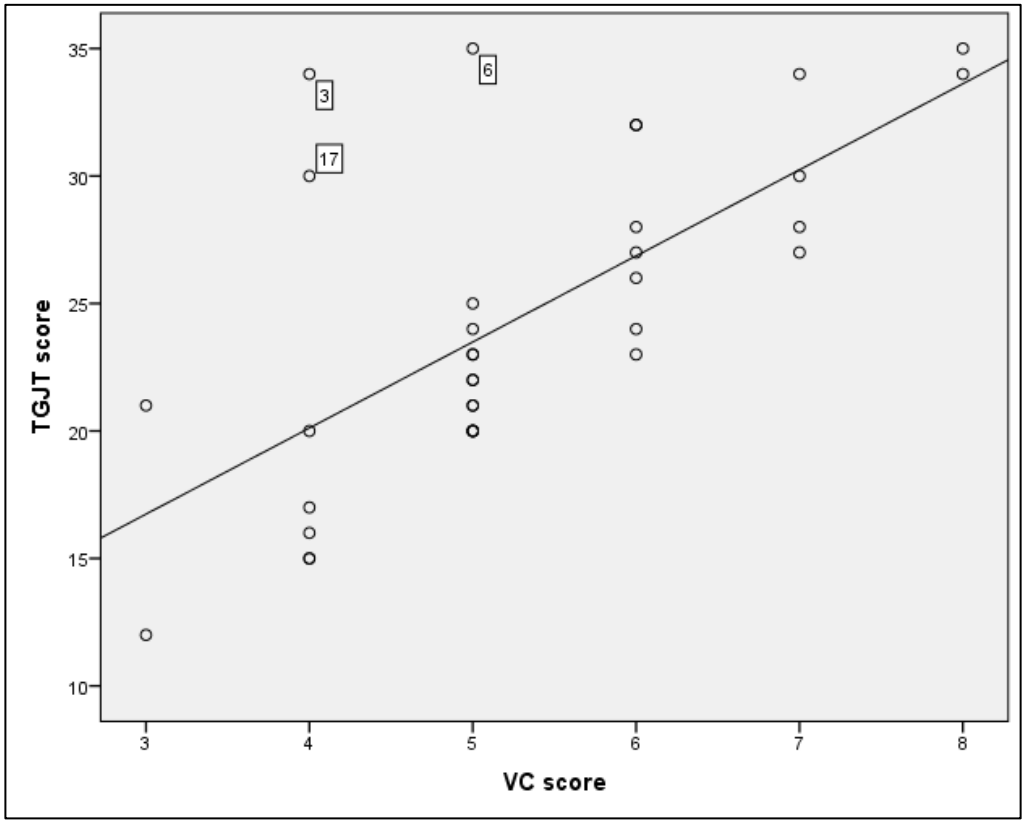

Figure 7: The Pearson Correlation between TGJT and VC scores

The figures and tables in the present research also show that the participants' learning patterns are in line with the Butterfly Effect of sensitive dependence on initial conditions. These learning pattern show that early on, in the first four months (that is March, May and October 2016 and January 2017), there were small insignificant changes in the learning process but over time (that is March 2017 and May 2017), the learning process accelerated (see Figure 9 and Figure 10). In fact, this evidence supports C/CT's butterfly effect (Lorenzelli, 2003).

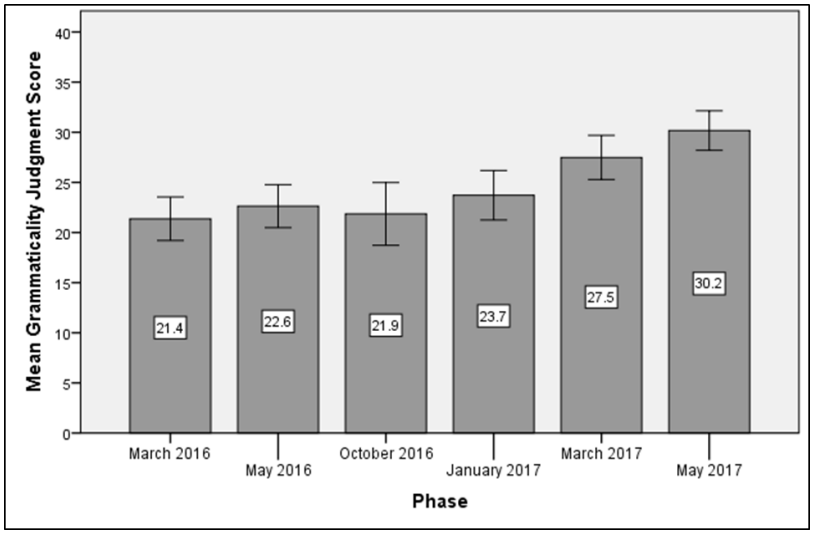

Figure 9: The Mean Scores of Timed Grammaticality Judgment Tests

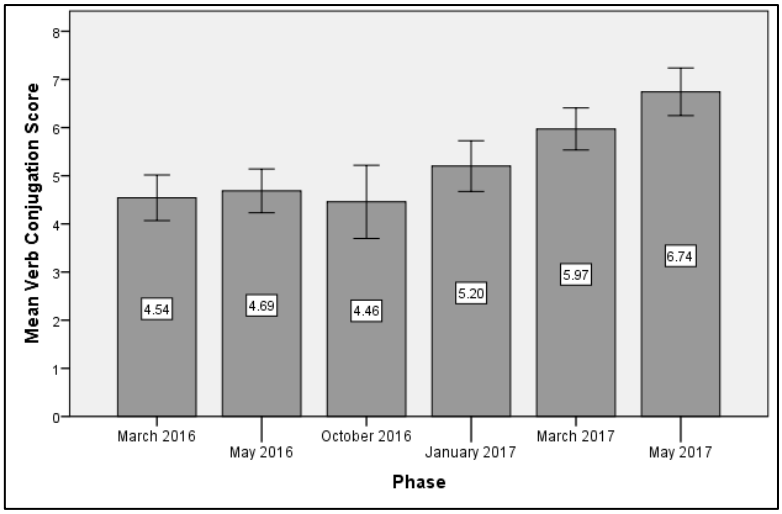

Figure 10: The Mean Scores of Verb Conjugation Tasks

The butterfly effect concept holds that small insignificant variations might lead to a drastic change at a later stage (Larsen-Freeman, 1987; 2011), especially if the participants go through the entire programme of learning Maltese verbs. Quantitatively, every figure matters (even the most insignificant change between two figures) in determining the final outcomes. Additionally, the stagnation of the learners in one range of scores does not mean that they are not learning (Lorenzelli, 2003). The participants who felt hopeless and believed they were not making any progress scored higher in May 2017 than in March 2016; hence, they made progress.

The fact that this study overall showed a non-linearity in the learning pattern of Maltese verbs as a foreign language should not imply that blames should be directed to teachers and learners. Nevertheless, according to C/CT, SLA is also complex, and there are many interacting factors at play in the developing interlanguage, such as first language transfer; the amount and type of input; the kind of feedback received; the age of the learner; the learner's aptitude, motivation, and attitude; personality factors; learning strategies; reasons for learning Maltese; the student-teacher relationship, the warmth and affectionate nature of the teacher; the pedagogy; and the initial conditions in the learning process (Larsen-Freeman, 1997, 2007, 2011). The reasons the participants gave to justify their scores did not matter because almost everyone experienced a non-linear learning pattern except for three participants – Aksel, Brunilda and Mohammed – who experienced an ogive learning curve on both grammar tests, and hence did not experience any decline in their scores.

Conclusion

Thirty-two participants experienced a non-linear learning pattern, while three learners experienced an ogive learning curve. Hence, we should not blame the learner or the teacher for the non-linear learning pattern. It was challenging to find a typical learning curve and to group the participants' learning curves into six groups. The main learning pattern is an increase of learning (vertical axis) over time (horizontal axis). Impressively, every learner scored a higher mark in his/her last grammar tasks in May 2017 as compared to his/her first score on both quantitative tasks in March 2016. It was interesting to see that most of the time, the participants scored in the same way in the timed grammaticality judgment tests as they scored in the verb conjugation tasks. This is one of the defining features of the fractal concept of C/CT. This study's figures showed that the participants' learning patterns agree with the Butterfly Effect of sensitive dependence on initial conditions. This learning pattern shows that early on, in the first four months, there were small insignificant changes in the learning process but over time, the learning process accelerated.

This research adds to the knowledge about the pattern of learning Maltese as a foreign language. It has been observed that a non-linear pattern emerges over time in the acquisition of verbal tense/aspect by adult foreign learners of Maltese. The reasons given by the participants for either a progressive or a decline in performance has provided insights into the learning of the verbal

tense in relation to learning Maltese as a foreign language. While this research has contributed to the field of SLA, especially in relation to MFL acquisition, there is need for more research with a large sample population in order to increase the validity and reliability of the findings and utilise this study for evidence-based practice.

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