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APRENDER A LER GREGO ANTIGO NA ESCOLA: A APRENDIZAGEM DE LÍNGUAS ANTIGAS E O BEHAVIORISMO CONTEMPORÂNEO

LEARNING TO READ ANCIENT GREEK AT SCHOOL: WHERE ANCIENT LANGUAGE LEARNING MEETS CONTEMPORARY BEHAVIOURISM

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Resumo: Neste artigo fala-se de uma intervenção behaviorista conhecida como Tecnologia do Ensino, concebida para facilitar a aquisição de competências de leitura, entre outras. No caso vertente, é apresentada e aplicada na aquisição da descodificação fonémica de grafemas gregos antigos nas fases iniciais da aprendizagem do grego antigo durante o primeiro ano do Liceu Clássico (a escola secundária italiana onde se estuda grego e latim). A Tecnologia do Ensino baseia-se principalmente no Ensino de Precisão e no uso da Tabela de Celeração Padrão, cuja aplicação à aprendizagem do grego será detalhada nestas páginas.

Palavras-chave: leitura do grego antigo, aprendizagem do grego antigo, ensino de precisão, tecnologia do ensino.

Abstract: In this paper, an existing behavioural intervention designed to facilitate the acquisition of, among others, reading skills, known as Technology of Teaching, is introduced and applied to the acquisition of phonemic decoding of ancient Greek graphemes in the context of the early phases of ancient Greek learning during the first year of *Liceo classico* (the Italian high school were both Greek and Latin are studied). The Technology of Teaching is mainly based on Precision Teaching and, as such, on the use of the Standard Celeration Chart, whose application to Greek learning will be detailed in these pages.

Keywords: ancient Greek reading, ancient Greek learning, Precision Teaching, Technology of Teaching

1. ANCIENT GREEK LEARNING AND CONTEMPORARY BEHAVIOURISM

The reference model for the proposal formulated in these pages is known as *Technology of Teaching*[1]: a behavioural technique developed to organize teaching practices that provides teachers with the observational tools of behavioural science. The main and most recent reference is the work by Kimberly Berens, a behaviour analyst specialized in the applications of behavioural tools in the field of teaching, *Blind spots: why students fail... and the science that can save them.*[2] The book introduces the Technology of Teaching as an alternative to the educational crisis in US schools—60 per cent of male and female students in the US are below *proficient* in reading skills,[3] compared to 21% of male and female students in Italy,[4] and those who lag furthest

1 Berens 2020: 137.

2 Berens 2020.

3 Berens 2020: 4.

4 OECD 2016: 2.

behind are boys and girls from the Hispanic American and African American communities, those with low incomes and those diagnosed with learning disabilities—and to the increasing medicalization of this crisis:[5] the technology allows, in a 40-hour period of activity, the acquisition of skills normally learned in over a school year (of which 40 hours represent little more than the average week in the United States). Moreover, these results do not come from a change in curricular content, but from a change in teaching practices.

If we imagine teaching as the process that generates the electric current of learning, then the Technology of Teaching is a magnetic field organized between two poles: a technique to design instruction, Direct Instruction or DI, and an assessment technique based on the direct measurement of student behaviour, Curriculum Based Measurement (CBM), which is applied on a national basis in the United States but currently has no equivalent in Italy for the subject areas of Greek and Latin. The two poles are represented by a tool for presenting content and a tool for long-term skills assessment and are shared by most teaching methods. In the Technology, an additional technique is added to them, Precision Teaching or PT, which, like a conductor moving in a magnetic field, generates the electric current of learning. Developed between the 1960s and 1970s by Ogden Lindsley, Precision Teaching is based on the principle of operant conditioning. It involves repeated and reinforced practice of a skill until predefined levels are reached, and a system of direct measurement of learning which applies the tools of behavioural science and will be described below. The Technology, like other scientific models, is based on inductive and individual observation, from which progressively generalized principles and techniques are defined, and is continuously subject to theoretical reworking conducted on new empirical data. In this article, the three components of such Technology are described through the

5 Berens 2020: 48-54.

case study of their application to Greek phonology learning at the level of high school education.

2. THE LEARN UNIT

Before introducing the components of such Technology in detail, let us focus on the forms of communication that mediate learning in the classroom context, considering the following example of verbal behaviour:

Discriminative stimulus (S^D)	**Response (R)**	**Consequence (S^{r+})**
"What does *οἰκία* mean?"	"Home!" issued by the student.	Smile from the teacher.
Discriminative stimulus (S^D)	**Response (R)**	**Consequence (S^{r+})**
'Home' issued by student.	Smile from the teacher.	Improved attention and accuracy of the student's response.

Table 1

In the first exchange, in behavioural terms the teacher's question is the stimulus in the presence of which the student's response (R) is emitted, thus, technically, the discriminative stimulus (S^D) for the response. The teacher's smile is the consequence produced in the considered environment by the student's response. If this consequence increases the likelihood of future emissions of the student's response, it is considered a social reinforcer (S^r) and functionally classified as a positive reinforcer (S^{r+}) because it consists of the *addition* of a new stimulus (the smile) to the environment. This principle of learning is known as operant conditioning and has notoriously been discovered by B.F. Skinner in the first half of the XX century. From the teacher's perspective, the student's response is the discriminative stimulus (S^D) for their smile (R), while the improvement in future student's response is the consequence likely functioning as a

positive reinforcer (S^{r+}). The two sequences of S^D, R and S^{r+} are technically called contingencies of reinforcement.

In behaviourial research, these connected exchanges are called '*interlocking contingencies*' and are considered the most important predictor of the occurrence of learning.[6] The unit produced by the interlocking of two reinforcing contingencies in the learning environment is called *learn unit* and has been defined as a measure of the 'symbiotic relationship' of the behaviour of the teacher and the learner.[7] The responses of one and the other agent are involved in a contingency of reinforcement, so both parties in the relationship are learning. The predictive power of the learn unit – which increases correct answers up to four to seven times when integrated into a teaching approach that does not include it –[8] supports its systematic application to teaching.

3. THE TECHNOLOGY OF TEACHING

3.1 PRECISION TEACHING (PT)

Precision Teaching is a teaching method based on the systematic application of the principle of operant conditioning and on a special system for measuring and collecting learning data that offers more accurate feedback than the traditional grading system. Typically, it consists of five successive phases:[9] phases 1 and 2 are preliminary to class work and are described below from the teacher's perspective; phases 3, 4 and 5 take place in the classroom and will be described with reference to this context.

6 Greer & McDonough 1999: 5.

7 Greer & McDonough 1999: 6.

8 Greer & McDonough 1999: 10.

9 Johnson & Street 2013: 5.

3.1.1 PHASE 1: INTERVENTION'S AREA AND OBJECTIVES

DEFINING THE AREA OF INTERVENTION

The first step in planning a Precision Teaching intervention is to define the area on which the teaching and learning processes will focus. In the case of this work, the selected area is the phonetic decoding of the alphabetic transcriptions of ancient Greek and the reading aloud of the ancient texts encoded by means of them: on one hand, phonetic decoding abilities represent the preliminary phase of all classical language learning courses; on the other, they constitute a ground on which the effectiveness of Precision Teaching has been repeatedly verified;[10] finally, phonetic decoding training may hold some surprises: in the case of ancient Greek, vowel quantity, syllable structure, vowel aspiration at the beginning of a word (or its absence), contraction, and phonetic manipulations that signal transformations in the tense and mode of verbs are just a few examples of features of the language that control phonetic skills and are also functionally related to the acquisition of more complex skills, such as correctly identifying a lemma in the vocabulary, distinguishing the syllabic quantity and operating a correct metrical reading, recognizing contracted forms, recognizing the forms of verbal modes and tenses etc.

INDUCTIVE SKILLS ANALYSIS FOR THE SELECTED LEARNING AREA

Once the field of intervention has been defined, the teacher inductively analyzes the complex skill of interest – in our example, the fluent reading of an ancient text – in order to identify all the discrete skills by which it is composed and whose acquisition is functional to that

10 Berens 2020: 173-175 and 195-200.

of the relevant complex skill. Skills can be identified with the help of grammars and an inductive analysis of an expert's reading behaviour. Such work could ideally be conducted in cooperative forms among Greek teachers. If high school grammars are used, the information they provide should be converted at this stage into trainable skills. For example, the indication 'every word beginning with a vowel or diphthong has on the vowel or on the second element of the diphthong a sign, the spirit [...], indicating the aspiration or lack of aspiration of the vowel'[11] should be converted in terms of practicable skills and rephrased, for example, as follows: "in the presence of a harsh spirit on an initial vowel or diphthong, pronounce the vowel or diphthong with aspiration; in the presence of a soft spirit in the same position, refrain from pronouncing aspiration".

ORGANIZING SKILLS HIERARCHICALLY

When skills are identified, they must be organized into three hierarchical levels, so that those on a lower level are in the service of others on a higher level, which in turn, result from the combination of those on a lower level and the generative implications of that combination; the three levels, in order of increasing complexity, are: 1. tool skills; 2. component skills; 3. composite skills.

At the first level, Precision teaching programs for reading identify *auditory perceptual behaviour*, *visual perceptual behaviour* and phonetic decoding of individual letters among other skills. The first consists of the ability to consciously manipulate the phonemes of a language.[12] The second is the ability to quickly see and name objects, written

11 Agnello & Orlando 2006: 21. Translation is mine.

12 Johnson & Street 2013: 102.

letters or symbols in sequence.[13] The third is the simple recognition of phonemes corresponding to the individual graphemes of the alphabetic system under consideration.[14]

At the second level, the component skills cooperate for the achievement of fluency in word recognition: one learns to connect single sounds, to read trisyllables, to sight-read monosyllables, disyllables, trisyllables and recurring morphemes such as prefixes, suffixes, and desinences, to connect morphemes in reading polysyllables, to sight--read polysyllables. Relevant to this expansion is the discrimination of accents, their position, the regularities between this position and the vowel quantities of accented syllables in ancient languages, the discrimination of spirits in Greek. As can be seen, this stage is functional for the acquisition of subsequent skills: the phonetic recognition of a prefix on multiple occasions, for example, can contribute to the rapid identification of its functions when this ability is trained in later stages of learning.

13 Johnson & Street 2013: 104.

14 Johnson & Street 2013: 102. The functional role attributed to these prerequisite abilities for the acquisition of reading fluency in the literature on Precision Teaching is consistent with the acquisitions of neuroscientific research on the neurological bases of reading. Through functional magnetic resonance imaging (fMRI), neuroscientific research has shown, during the performance of reading behaviour, activation of the occipitotemporal region - which responds above all to visual stimuli -, in a position close to a region activated above all in response to the sight of faces, with significant left lateralization (Dehaene 2007: 85); the areas subsequently activated diverge in correspondence to the stimulation received: if faces are involved, areas of the right hemisphere are activated; if writing is concerned, areas involved in verbal behaviour are activated (ibidem). "Grapheme-phoneme decoding involves the superior regions of the left temporal lobe, which we know to be involved in the analysis of sounds, particularly words' sounds; the inferior frontal cortex and the left precentral cortex that are involved in the articulation of language. It is at the level of the temporal lobe that letters and intended sounds come together" (Dehaene 2007: 123, translation is mine). In the acquisition of the ability to read transcripts of foreign languages, the peaks of brain activity are moreover located in the same areas that are activated during the reading behaviour of one's mother tongue transcriptions and it is likely that such reading relies on already acquired skills (Dehaene 2007: 112).

Proceeding to the third level, the composite skill for phonetic decoding is fluent reading of a passage.[15] In the case of classical languages, stimulus generalization should occur, i.e., the skill should be trained to be flexibly adapted to all stimuli that differ in topography but control the same response. This is achieved through training in formally different contexts, such as texts in prose, in hexameters, in elegiac couplets, in iambic trimeters, in capitals, in easily decodable epigraphic writing, etc. A training of this kind will allow for smooth responses in later stages of learning: when texts with similar formal characteristics to these are analyzed, their distinctive topography — which may in turn be subject to discrimination training — will not hinder the acquisition of the more complex order skills they typically require, because no specific training will be required for fluent reading in such contexts.

In summary, when the field of intervention is defined and the skills are identified and organized into three levels of increasing complexity (table 2), the discriminative stimuli for each and the responses they control must be clearly defined (tables 3) and a training sequence must be identified (table 4). For the purposes of this training, clear instructions must be developed (table 5), an issue to which we will return later.

Tool skills	· Visual perceptual behaviour · Auditory perceptual behaviour · Recognising phonemes (see table 3) · Recognising accents · Distinguishing between vowels and consonants · Discriminating short and long vowels · Discriminating voiced, unvoiced, aspirated, sibilant, liquid and double consonants · Discriminating accents · Discriminating spirits

15 Johnson & Street 2013: 111.

Component skills	· Reading a monosyllable · Reading a disyllable with the correct accent · Reading a trisyllable with the correct accent · Reading and correctly accentuating a polysyllable · Recognising and reading prefixes, suffixes, and desinences · Understanding names
Composite skills	· Reading the word/enclitic group correctly · Reading a simple sentence correctly · Reading complex sentence correctly · Reading a paragraph correctly, maintaining a reading rhythm · Understanding texts

Table 2. Tool skills, component skills, compound skills in reading Greek texts.

Grapheme	**Phoneme**	**Grapheme**	**Phoneme**
α	/a/ /a:/	μ	/m/
αι	/ai/	ν	/n/
αυ	/au/	ξ	/ks/
β	/b/	ο	/o/
γ	/g/	οι	/oi/
γκ, γχ, γγ, γξ	/ŋk/, /ŋk^{h}/, /ŋg// ŋks/	ου	/u/
δ	/d/	π	/p/
ε	/e/	ρ	/r/
ει	/ei/	σ, ς	/s/
ευ	/eu/	τ	/t/
ζ	/zd/	υ	/y/
η	/ε:/	υι	/yi/
ηυ	/εu/	φ	/p^{h}
θ	/t^{h}/	χ	/k^{h}/
ι	/i/	ψ	/ps/
κ	/k/	ω	/ɔ:/

Table 3. Identification of discriminative stimuli and responses for the tool skill: decoding the Greek alphabet. Adapted from Allen (1968, passim).

No.	Properties of the stimuli	Examples of tool and component skills
1	V	Recognizing and discriminating α, ε, η, ι, ο, υ, ω, A, E, H, I, O, Y, Ω
2	Punctuation marks	Recognizing and discriminating punctuation marks
3	Long/short vowels	Recognizing and discriminating long and short vowels
4	CV:	Recognizing and discriminating cases such as νω, δὴ, κυῖ, δοῦ, μή, γῆ, δεῖ
5	CV	Recognizing and discriminating cases such as τε, σύ, γε, δεῖ, νὰ, δέ
6	Aspirated	Recognizing and discriminating θ, φ, χ, Θ, Φ, X
7	Unvoiced	Recognizing and discriminating κ, π, τ, K, Π, T
8	Voiced	Recognizing and discriminating β, γ, δ, B, Γ, Δ
9	Labials	Recognizing and discriminating π, β, φ, Π, B, Φ
10	Palatals	Recognizing and discriminating κ, γ, χ, K, Γ, X
11	Dentals	Recognizing and discriminating τ, δ, θ, T, Δ, Θ
12	Nasals	Recognizing and discriminating μ, ν, M, N
13	Liquids	Recognizing and discriminating λ, ρ, Λ, P
14	Sibilant	Recognizing and discriminating σ, ς, Σ
15	Double consonants	Recognizing and discriminating ψ, ξ, ζ, Ψ, Ξ, Z
16	CVC	Seeing and decoding γάρ, σός, σύν, κος, ρός, λαμ, λος
17	CCV:	Seeing and decoding σθαι, πλῆ, μφό, στη, θνή, γκυ
18	CCV	Recognizing and decoding ξα, ἀφικνέ, τρέ, στό, ζω
19	VC	Seeing and decoding ος, ον, ἐκ
20	V:C	Seeing and decoding εἶς, ἦσ, ναῦς, εἰς, ὡς, οὖν, ων
21	CV:C	Seeing and decoding πῶς, μήν, παῖς, νῦν
22	CCVC	Seeing and decoding πρᾶγ, τρεῖς, θμός, κτός, κρός, γγύς
23	CCV:C	Seeing and decoding πρᾶγ, τρεῖς
24	Diphthongs	Recognizing diphthongs, discriminating between proper and improper diphthongs, discriminating between diphthongs and hiatuses

25	**Hyatuses**	Recognizing hiatuses, discriminating between hiatuses and diphthongs
26	**Contractions**	Recognizing the possible outcomes of vocalic contractions; discriminating between different outcomes
27	**Prefixes**	Seeing and decoding κατά, πρός, ἐπί, ἀπό, ὑπό, ἐ
28	**Desinences**	Seeing and decoding ή, ῆς, ω, σα, κα, μαι
29	**Suffixes**	Seeing and decoding τής, ίων, ως
30	**Prefixes and suffixes**	Seeing and decoding ἐβούλευσα
31	**Disyllables**	Seeing and decoding δοῦλος, ποῖος, ὅπλον, πάντως, πέντε, δέκα
32	**Elisions**	Recognizing the sign of elision, correctly pronouncing the sequence of the elided word and the word that follows, recognizing whether the elided word has undergone regressive assimilation
33	**Crasis**	Recognizing the co-occurrence of crasis and coronis; discriminating coronis from smooth spirit on the basis of its position; recognizing words in crasis for the most frequent cases
34	**Suffixes and desinences**	Seeing and decoding σθην, σκω, θην
35	**3, 4, 5 syllables or more (and accentuation)**	Seeing and decoding πίστεως, βελτίων, ἁλίσκομαι, βεβοήθηκα, ἐλεύθερος
36	**Reduplication**	Seeing and decoding βεβούλευμαι, δεδίωχα, τετόλμηκα
37	**Acute accent**	Discriminating the acute accent
38	**Grave accent**	Discriminating the grave accent
39	**Circumflex accent**	Discriminating the circumflex accent
40	**Oxytone, paroxytone, proparoxytone**	Discriminating words according to the position of the acute accent
41	**Perispomenon, properispomenon**	Discriminating words according to the position of the circumflex accent

42	**Trisyllabism**	Accenting polysyllables correctly, recognizing accent boundaries, discriminating the accessible positions for the acute accent and circumflex accent in different syllable combinations with succession of different vowel quantities
43	**Final trochee**	Accenting correctly in case of final trochee
44	**Barytonesis**	Recognizing the presence of grave accent and non-accentation for oxytonic word followed by tonic word, discriminating negative example of oxytonic word followed by punctuation or atonal word; recognizing and discriminating non-example τίς, τί
45	**Enclitics**	Recognizing enclitic words; discriminating tonic words and enclitic words; correctly reading tonic word and enclitic words sequences, i.e., sequences in which a tonic word is followed by, among others, μου, τις, τι (to be discriminated from τίς, τί), που, εἰμι, φημι, γε.
46	**Enclisis of accent**	Discriminating enclisis of accent; correctly accenting tonic word and enclitic word sequence in the presence of the accent of enclisis.
47	**Proclitics**	Recognizing proclitic words; discriminating tonic words, proclitic words, enclitic words; correctly reading proclitic word and tonic word sequences, i.e., sequences in which a tonic word is preceded by ὁ ἡ, οἱ, αἱ, ἐν, εἰς, ἐξ, ἐκ, ὡς, εἰ, ὡς, οὐ, οὐκ, οὐχ

Table 4. Some of the main tool and component skills for phonetic awareness and decoding of Ancient Greek transcriptions for fluent reading: decoding of sounds and groups of sounds, monosyllables, disyllables, trisyllables, correctly accented and aspirated polysyllables, word groups. On the left column the properties of the stimuli, on the right column the relevant skill to be acquired and the stimuli that control it. Elaborated on the model of the table for the teaching of reading in PT, cf. Johnson & Street (2013: 109-110) and on the basis of the Greek phonetics indications for high schools taken from Agnello & Orlando (2006: 17-33).

Type of skill	Skills	Examples of instruction

Tool skills	auditory perceptual behaviour	"I will pronounce the sounds of a Greek word and you will pronounce the whole word" (*blending*); "I will pronounce a word in Greek and you will pronounce the individual sounds you hear that compose it" (*segmenting*); "I will pronounce a word and I will ask you to delete one sound and pronounce it again without that sound" (*auditory discrimination*); "I will pronounce two words that are different by only one sound and you will tell me the missing sound in the second word (*auditory discrimination*).
	visual perceptual behaviour	"I will say the name of some objects that are well documented in the material contexts of the ancient Greek world, then I will show you a picture of the object and ask you what it is called. We will continue in this way for the whole list of objects."
	emission of the appropriate phoneme in the presence of the grapheme encoding it	See table 3.
Component skills	pronouncing letter sounds and letter combinations;	After writing γ, "This letter is pronounced /g/. How do you pronounce γα? But this letter is not always pronounced /g/. In the combination γγ is pronounced /ŋ/. How do you pronounce ἐγγύς? In the combination γκ it is also pronounced /ŋ/. How do you pronounce ἄγκυρα? In the combination γχ it is also pronounced /ŋ/. How do you pronounce ἄγχι? Is γ is pronounced /ŋ/ too in ἀγάπη? [negative example] How is it pronounced here?"
	connecting sounds and pronounce monosyllables, disyllables, trisyllables	Instructions may concern words that have a functional relationship with the skills that will be acquired later (e.g., the definite article as an example of a monosyllable, recurring nouns as an example of disyllables etc.).

	pronouncing monosyllables, disyllables, trisyllables at sight	It again seems advisable to use examples for which subsequent skills will be trained.
	pronouncing parts of words	Instructions may concern prefixes, suffixes, desinences.
	join sounds and parts of words to pronounce polysyllables, correctly accentuate pronounced polysyllables	Instructions may concern specific Greek accentuation regularities.
	pronouncing polysyllables on sight	Instructions may relate to recurring forms of conjugated verbs: acquiring phonetic awareness of these could functionally aid the acquisition of future *cues* recognition skills for mode, tense, person, etc.
Composite skills	fluency in reading a passage	Instruction and practice may proceed from short prose passages to passages with different typographical organizations, and thus with different topographies, to encourage the generalization of fluent reading skills to as wide a variety of contexts as possible (epic, lyrical, theatrical passages, inscriptions, papyri, codices, provided they are appropriate to the level of instruction).

Table 5. Distinction into tool, component and composite skills and examples of related instructions.

LEARNING CHANNELS

The skills can be further analyzed by defining the 'learning channels'[16] for the practice of each. Table 6 shows in the left-hand column the sensory inputs received during a learning session; in the bottom row

16 Johnson & Street 2013: 44.

the responses (outputs) emitted in their presence. From this matrix, it is possible to define training activities for the identified skills.

Think											
Touch											
Taste											
Sniff											
See											
Hear											
Feel											
	Aim	Do	Draw	Emote	Mark	Match	Say	Select	Tap	Thought	Write

Table 6. Learning channels. Reproduced from Johnson & Street (2013: 45).

Consider these examples for alphabetic decoding ability: 1. hearing a phoneme/writing the corresponding grapheme; 2. see a grapheme/pronounce the relevant phoneme; 3. see a grapheme/write the corresponding phoneme; 4. hear a phoneme/pair it with the corresponding grapheme chosen from a group. This analysis makes it possible to clearly define the behaviours that can be learned for the same skill performed in different contexts. These behaviours can then be included in the learning objectives and practiced through a number of exercises generated from the matrix itself, which could of course be extended.

DEFINING FLUENCY AIMS

Precision Teaching is oriented towards practicing a skill until it is mastered in fluency. Fluency is defined as a rapid, automatic, effortless mode of execution. The achievement of fluency is an indicator of the neurological permanence of the skill and predicts the rapid acquisition of other, more complex skills.[17]

17 Berens 2020: 138-139.

Analysis of learning data has shown that fluency can be considered achieved when the learned response is emitted at the same rate or frequency of response (i.e. number of responses per minute or another time unit).[18] Let us consider the example of recognizing a grapheme and emitting the corresponding phoneme: identifying the level of fluency means measuring the number of graphemes read by an expert in the presence of a list in 1 minute. If, under these conditions, the expert made 130 correct discriminations in 1 minute, the rate of response necessary to achieve fluency is 130 correct discriminations in 1 minute. From this measurement, it is possible to define the objective "in the presence of a list of graphemes, see the graphemes, pronounce the respective phonemes, giving 130 correct answers in 1 minute". A specific and measurable objective like this is formulated for each behavior identified as needed for the acquisition of the target skill. An objective comprises three elements: 1. a description of the conditions under which the response to be measured is to be emitted; 2. a specific and measurable description of the response to be issued; 3. the level of fluency that must be achieved for the response.

If the fluency aim is achieved, the skill is maintained over time, resistant to fatigue, stable in the presence of distractions, applicable to new real-world contexts, and generative.[19] Conversely, if the level of fluency in execution is not achieved, tasks requiring the application of the skill are performed with resistance or hostility. In the teaching of ancient languages, the failure to achieve fluency in the various language learning phases could mediate the subsequent rejection of ancient language texts and translation tasks. Everything is, from the outset, too complex, and too many things are required to be learned simultaneously in a short time, due to the absence of more precise tools to monitor actual learning and the limits that this imposes on teaching. Although it is often said that students do not listen to

18 Berens 2020: 140.

19 Johnson & Street 2013: 27.

teachers in school, behavioural science seems to show a fact that is at least as true: that teachers often do not listen to their students' learning. A fundamental assumption of the Technology of Teaching is that "complex repertoires must be modelled over time, through repeated and reinforced practice of essential components-skills":[20] if effective learning has not taken place, if lower-level skills have not been acquired, it is likely that the transition to higher-level skills will pose significant difficulties for students who have no responsibility for the issue they are facing. When a skill is identified, it is therefore necessary to specify its fluency response rate. This must be repeated for all the skills to be taught. These fluency aims will be included in the teaching objectives.

DEFINING PINPOINTS FOR PRACTICE

The objectives thus defined make it possible to clearly describe the skill that will be modelled and taught in class. Although we are still describing the stages that are preliminary to class work, it can be now anticipated that the lesson will be divided into an instructional session and a practice session. For the practice session, each objective must be converted into a concise description of the behaviour to be trained, called a *pinpoint*. Let us consider the goal described above ("in the presence of a list of graphemes, see the graphemes, pronounce the respective phonemes, giving 130 correct answers in 1 minute"). The relevant pinpoint can be formulated as follows: "see a grapheme/pronounce the phoneme, 130 responses/1 minute". As can be seen, the pinpoint describes the behaviour in a very concise form, it clarifies the learning channels used in the session and indicates the response rate to be achieved. The pinpoints will be practiced in

20 Berens 2020: 134.

the same order of increasing complexity in which the relevant skills are presented throughout the lessons. The response speed specified by the pinpoint represents the end point of the exercise sessions. In the early stages of training, the response speed may be relatively low. With repeated and reinforced practice, this value increases. Experimental observation of behaviour has shown that the response rate during learning increases with a multiplicative trend.[21] The learning of a response in a time interval can therefore be measured by the acceleration of the rate of response in that time interval. In the preliminary stages of a Precision Teaching intervention, the minimum acceleration required for optimal learning is also defined. The weekly doubling of the rate of response, a trend referred to in jargon as 'times 2', is considered a good minimum target. This acceleration allows learners to become aware of the occurrence of their learning.[22] We will consider the practical implications of the concept of acceleration later.

3.1.2 PHASE 2: DEVELOPING MATERIALS AND PROCEDURES

PROBE TESTS

When the pinpoints are defined, suitable material is gathered or developed for the training phase of each pinpoint and the measuring of the response speed achieved at each moment of practice. The acceleration of rate of response provides direct feedback to the effectiveness of the teaching intervention and the learning practice: if it occurs, both are working; if it does not, they must be transformed. Testing, in this approach, simply consists of direct

21 Berens 2020: 87.

22 Berens 2020: 142.

and timed measurements of a learner's behaviour taken during the learning practice. The direct measurement of behaviour makes an alphanumeric grading system based on the percentage of correct answers obsolete: such a system is considered ineffective in measuring response fluency and thus the level achieved in the practice of any particular skill (equal percentages of correct answers can be achieved in different time intervals, obscuring the different levels actually achieved in each case and limiting the effectiveness of teaching interventions). With each test, Precision Teaching measures and records the response rate for a set of stimuli, provides reinforcement and precise feedback for errors: each test is also a practice session.

The characteristic test of Precision Teaching is called a *probe test* and measures the rate of response achieved at a certain point in the practice period. The material for a probe test is a printed sheet on which the discriminative stimuli for the response to be learned are arranged. During the test, the learner will respond to the stimuli in a predefined time interval (usually 1 minute) and his correct and incorrect responses will be counted. In this way, his or her rate of response at the time of the test can be detected.

One example of probe test is given below for the alphabetic decoding ability of Greek for single letters and letter groups. For each pinpoint, several probe tests should be developed comprising the same stimuli in randomized order, so that multiple measurements can be taken in the same practice session to monitor ongoing learning. Each test should contain more stimuli than those specified in the fluency aim, so that no artificial ceiling is placed on the learner's responses. Furthermore, each of these tests should be available in one copy for the learner and in one copy for the person who checks the answers and marks the correct, uncertain, and incorrect ones (the teacher or a partner in the case of pair work, see § 2.1.3.2).

Probe test

Counted behaviour: seeing/reading the graphemes of the Greek alphabet.

Correct answers: ___ Incorrect answers: ___ Time: ___

Response rate (correct responses): ___ Response rate (incorrect responses): ___

η	ευ	α	μ	γγ	γχ	Ξ	ο	ι	γκ	ζ	ω	12
ε	σ	κ	Χ	γ	λ	Οι	θ	ν	ρ	υι	δ	24
β	τ	ου	ει	αυ	γξ	Φ	αι	ς	ηυ	π	ψ	48
υ	ψ	ε	αι	α	ευ	Υι	ει	κ	γγ	ν	λ	60
γξ	ω	ου	υ	χ	ς	Π	σ	γχ	θ	γ	ζ	72
οι	ηυ	η	αυ	ο	ξ	Δ	μ	τ	ρ	φ	ι	84
β	γκ	ρ	ο	γξ	λ	Ευ	ζ	η	γγ	αυ	οι	96
γ	φ	α	ε	π	ι	Ηυ	κ	σ	γκ	ψ	αι	108
υ	ει	ω	γχ	μ	ξ	Ν	τ	θ	β	υι	χ	120
δ	ς	ου	ει	λ	ζ	Π	οι	ευ	μ	αυ	θ	132
κ	α	γκ	ς	δ	ι	Ρ	γξ	ο	χ	ω	β	144
ψ	αι	ου	ν	τ	γγ	Υ	γχ	σ	γ	ε	υι	156
ηυ	η	ξ	φ	ε	ζ	Ρ	γξ	μ	ω	αυ	β	168

Table 7. Example of probe test for the practice of the pinpoint 'see/read 90-70 letters per minute'. Fluency aim: 90-70 sounds per minute (40-25 in the early stages: sound must be maintained for 2-3 seconds; intermediate pinpoint for reaching rate of 130 letters per minute). Acceleration target: x2.

3.1.3.1 PHASE 3 A: INSIDE THE CLASSROOM. INSTRUCTION

Having defined both objectives and materials, we can now enter the classroom. The lesson we are going to envision is geared towards achieving an early goal for Greek phonetics: "in the presence of a list of letters in a randomized order, recognize and read aloud 90-70 letters in 1 minute". The fluency aim is, at this stage, preliminary, thus intentionally lower than the final goal of 130 letters in 1 minute.

The first phase of the lesson is geared towards providing the essential indications for acquiring the skill, actively involving the class. In the second phase, the "see/read 90-70 letters in 1 minute" pinpoint practice begins, with probe tests like the one proposed above. Let us consider the first phase, in which the technique of Direct Instruction, as a component of the Technology of Teaching, is applied.

3.2 DIRECT INSTRUCTION (DI)

Direct Instruction is an explanation technique. Although it was developed separately from the field of behaviour analysis, it is consistent with it and supported by it:[23] it is based, like Precision Teaching, on the inductive analysis of curricula, with the aim of developing clear explanations and unhindered communication. The concepts taught are learned and then applied to new problems, thus fostering the acquisition of a repertoire of generative skills.

In DI, instructions are presented in direct form (hence the name), while the teacher invites the class to answer new questions based on the information received. For example, if the teacher writes the sign θ and presents the instruction "this is a *theta* and it is pronounced / t^h/" and they also provide a negative example, e.g., by writing a β and asking "is this a *theta*?" — providing examples and not examples is considered an essential procedure to foster discrimination and model a flexible response repertoire —, then, if they write the sign Θ and present the instruction "this is an uppercase *theta*", they can ask at a rapid pace "how is this pronounced?" and immediately provide social reinforcement to the response derived from the combination of the previous instructions. They can then point to the first sign again and ask: "and how is this pronounced?". After several examples, the teacher

23 Berens 2020: 151.

can continue by changing the learning channel, with instructions like: "now I will pronounce some Greek phonemes. Each time I pronounce one phoneme, you have five seconds to write down the corresponding letter. Let's start. /tʰ/." Then, the teacher may write three letters on the blackboard and ask: "which one did you write among these?" to immediately check the students' choice and reinforce the correct answer. The pace at which instructions are presented and answers are reinforced or precisely corrected is rapid[24] and the presentation can be concluded in a relatively short time interval (e.g., 10-12 minutes), which can be directly followed by practice (e.g., in pairs). The answers given in the instruction phase can in turn be counted by the teacher and the baseline rate of response calculated in the relative time interval, so that the rate of response of the training phase can later be compared to the rate of response achieved in subsequent practice phases.

3.1.3.2 PHASE 3 B: TIMED PRACTICE AND RATE OF RESPONSE

Following the teaching phase conducted with active students' involvement, the practice phase begins. In the context of the class, it can be useful to organize it in pairs or groups of three. The students are provided with the materials prepared or collected by the teacher, a timer (which can easily be found on any smartphone) and a particular chart that will be described later (see Phase 4). If, as in the example we are considering, it is the first time in which such a practice is being conducted, some preliminary indications are necessary: "In the next half an hour you will work in pairs on the material I have distributed. Each of you has sheets of paper containing a list of Greek letters in random order. Within each pair, one of you will start the practice first. The practice will go like this: you will take a test, your partner or desk

24 Berens 2020: 155.

mate will start a one-minute timer, and, in that minute, you will read as many letters as you can. Remember: the aim is not to hurry, but to try to maintain a rhythm. Your desk partner will mark those that you read with confidence with a tic, those that you read with uncertainty with a circle and those that you cannot read with an x. When the minute is up, your desk-mate will show you their support — mind you! — and point out precisely which letters you recognized, those you had difficulty with and those you did not recognize. Together, you should record the number of correct answers in 1 minute and the number of mistakes in 1 minute on the test sheet. You have a minute or two to practice the letters you did not recognize or just some of them, e.g., by writing them down under the dictation of your partner or desk-mate, or by using the flashcards which you can find among the documents I have given you. After the review period, your desk-mate will start the timer again, inviting you to beat your last result. You will repeat this practice until you have recorded the answers of 10 tests each. Then, you will switch roles and do the same for the person next to you. I will pass between you to check that you are recording the data well, to answer any questions, and to give you revision tips, OK? Let's get started." Practice for the whole class should continue for between 20 and 30 minutes and not exceed this interval, after which it tends to become mechanical and repetitive.

3.1.4 PHASE 4: RECORD THE FREQUENCY ON THE STANDARD CELERATION CHART

At this stage, the graph developed in 1967 by Ogden Lindsley to provide teachers with a tool for scientific analysis of the learning process of any behaviour and to standardize the representation of data is used. The graph allows you to plot rate of response values, usually calculated over a 1-minute interval, for the same behaviour on successive days. The visual data analysis shows whether the rate is increasing, decreasing or

remaining stable, i.e., whether learning is accelerating, decelerating or not accelerating. This is why the graph is called the Standard *Celeration* Chart, a term invented by Lindsley himself. Based on this visual analysis, it is possible to take a snapshot of the actual learning progress, receive feedback on the effectiveness of teaching and transform the teaching method in real time, if necessary. If learning is decelerating, it can be decided to simplify the test by reducing its duration (to the so-called *sprint*: a 15-second interval) or the number of stimuli; reinforcement can be substituted; fluency of simpler level skills can be checked to ensure that it has been maintained. Consideration is also given to the student's opinion, which can provide useful insights into perceived obstacles.

FEATURES OF THE STANDARD CELERATION CHART

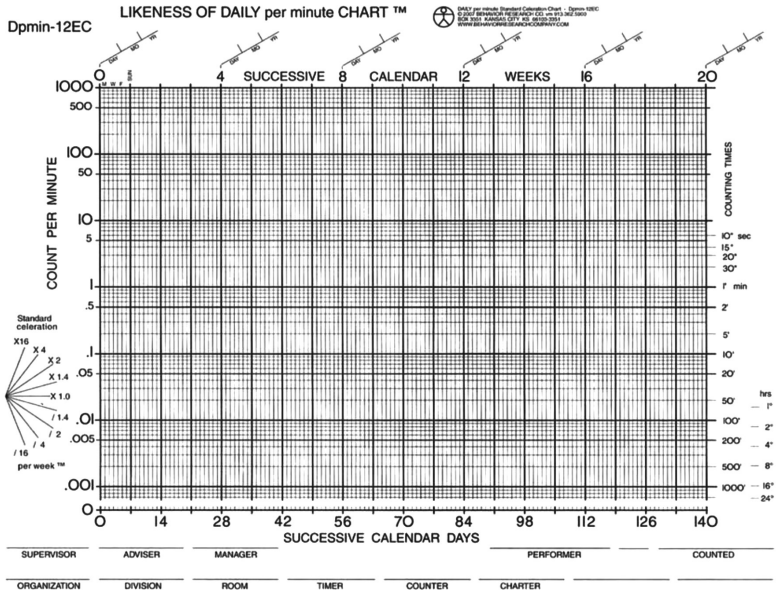

Figure 1. Daily Standard Celeration Chart (Daily SCC).

In the figure, a Standard Celeration Chart for daily measures is shown. The lower horizontal axis of the graph indicates the days in a school period (for approx. 5 months), while the upper horizontal axis indicates the weeks. On these axes, equal space intervals correspond to equal time intervals. Each vertical line indicates a day of the week. Thicker lines indicate Sundays. The values on the left-hand vertical axis indicate the number of answers counted during a probe test. The scale is logarithmic: equal intervals correspond to equal multiplications or divisions. For example, the interval between 1 and 5 and the interval between 10 and 50 signal a multiplication by 5, while the intervals between 5 and 10 and 50 and 100 signal a multiplication by 2. The tripartite spaces along the horizontal axis at the top of the chart should be filled in by marking the date of each Sunday of the period of intervention, starting with the one preceding the beginning of the intervention (top left of the graph) and repeating the annotation for the following Sundays, considering that each one is four weeks away from the previous one. In this way, it will be possible to visually identify the intermediate days. The values along the right-hand vertical axis indicate certain time intervals among which the selected duration for the probe tests whose results will be plotted in the graph can be identified. The standard interval is 1 minute. Whether you select this interval or another, this choice is indicated by drawing a dash just below the horizontal line corresponding to the chosen time interval, taking care to place it near the left vertical axis of the graph. This dash identifies the *record floor*. The record floor indicates the duration of the measurement session (right) and the minimum value that can be recorded in that duration (left). In the case of a duration of 1 minute, the minimum value that can be recorded is 1, i.e., one response. If the duration chosen is 2 minutes, the minimum value is still 1, but for the purposes of tracking it on the SCC, the minimum value that would have been recorded if the measurement had lasted 1 minute, i.e., 0.5 (a purely mathematical indication), must

be identified. Thus, the minimum value of responses that would be counted over 1 minute for each time interval is the value on the left vertical axis which corresponds to the relative time interval on the right vertical axis, i.e., the value of counted responses corresponding to each record floor. If no response is recorded in the time interval, an x is conventionally marked immediately below the record floor on the vertical line corresponding to the day of the survey. In the lower portion of the graph there are some spaces to note information such as the name of the learner and the counted behaviour.

HOW TO USE THE STANDARD CELERATION CHART

Let us suppose we worked with a student, gave her a 1-minute timed probe test for recognizing the letters of the Greek alphabet and noted down 9 correct and 3 incorrect answers. To map these data, we will need to: 1. locate the vertical line corresponding to the day of registration (let us imagine it is Monday: it is identified by counting a single line to the right of the thick line of Sunday); 2. identify the horizontal line corresponding to the number of correct answers (9 answers: one line below 10); 3. Mark the point of intersection between the vertical line of the day and the horizontal line of the number of responses with an ink dot; 4. identify the horizontal line corresponding to the number of incorrect answers (3 answers: two lines above 1); 5. Mark the point of intersection between the vertical line of the day and the horizontal line of the number of answers with an x. If the number of responses does not correspond to a line on the graph, the figure must be plotted as an estimate. For example, the value of 15 responses corresponds to a point approximately halfway between the horizontal line corresponding to value 10 and the horizontal line corresponding to value 20. When data are collected, the teaching intervention focuses on incorrect answers. New surveys are recorded on subsequent days. If the didactic

intervention is successful, the dots for the correct answers recorded on different days should arrange themselves along a line that has the same slope as the segment with the 'x 2' mark visible at the bottom right of the graph. In this case, the rate of response is accelerating. If this does not happen, the intervention must be reconsidered.

HOW MULTIPLE MEASUREMENTS ARE RECORDED FOR THE SAME DAY

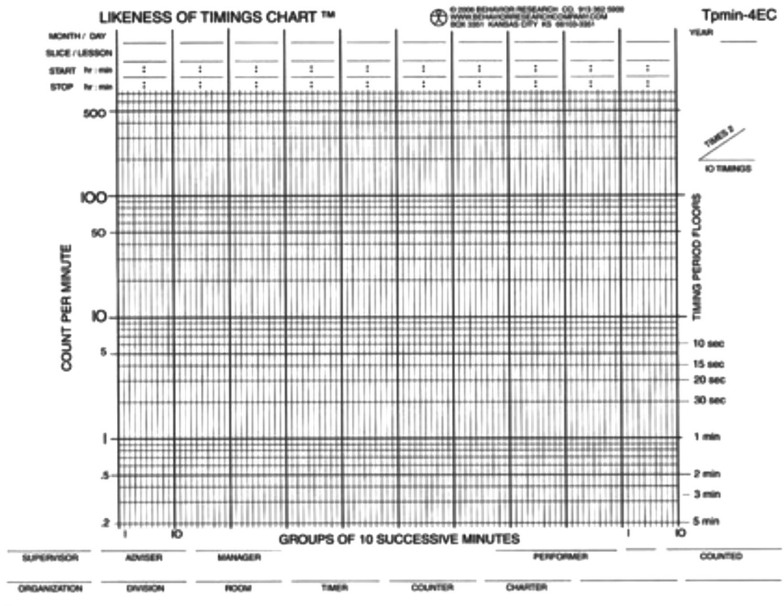

Figure 2. Timings Standard Celeration Chart (Timings SCC).

In Precision Teaching, another Standard Celeration Chart is also used: the Timings Standard Celeration Chart (figure 2), which allows the rate of response to be recorded for 10 intervals, or timings, in the same session. In this way, if acceleration is not occurring, the intervention can be immediately modified.

In this graph, each vertical line corresponds to a record interval, i.e., a probe test. At the top of the graph there are spaces to indicate the date of the lesson, the pinpoint being practiced and the start and end time of the practice. Again, the standard interval for probe tests is 1 minute and, whether or not another interval is chosen, the relevant record floor is indicated. All data will, however, be proportionally reported on 1 minute. If, for example, you practice a 15-second *sprint* and record the minimum value of 1 response in 15 seconds, you will mark the value 4 on the graph, corresponding to the 15-second record floor. 4 responses/1 minute is, in fact, the minimum non-zero value which is estimated one would have recorded if the probe test had lasted 1 minute: as 15 seconds is ¼ of a minute, 1 response/15 seconds equals 4 responses/1 minute. Having defined the basic characteristics of these instruments, let us imagine taking them both into the classroom.

USING STANDARD CELERATION CHARTS IN THE CLASSROOM: THE FIRST LESSON

Let us now apply the Standard Celeration Charts to the recording of data collected during the probe test for the pinpoint 'see/read 90-70 letters per minute'. Among the documents available to the students, along with the probe tests, are a Daily Standard Celeration Chart and some Timings Standard Celeration Charts. These materials will be used for a series of lessons. Let us imagine the case of a student who, on the first record of the day, correctly recognizes 7 letters and does not recognize or incorrectly recognizes 3 letters in the 1-minute interval. Having marked the record floor of 1 minute on the chart, we mark a dot at the point of intersection between the vertical line of the first timing and the horizontal line corresponding to the value 7 on the left vertical axis; we mark an *x* at the point of intersection between

the same vertical line and the horizontal line corresponding to the value 3 on the left vertical axis. The figure of 7 correct answers in 1 minute represents the student's *personal best.* From this value, the expected acceleration line is drawn: a line that has the same slope as the segment with the words 'times 2' reproduced in the top right--hand corner of the graph. This line, intersecting the vertical line corresponding to the last (tenth) timed test of the session at the value of 14 answers (the value is estimated to be halfway between 10 and 20), establishes a *fluency aim* of 14 correct answers in 1 minute to be achieved by the end of the day's test period (figure 3).

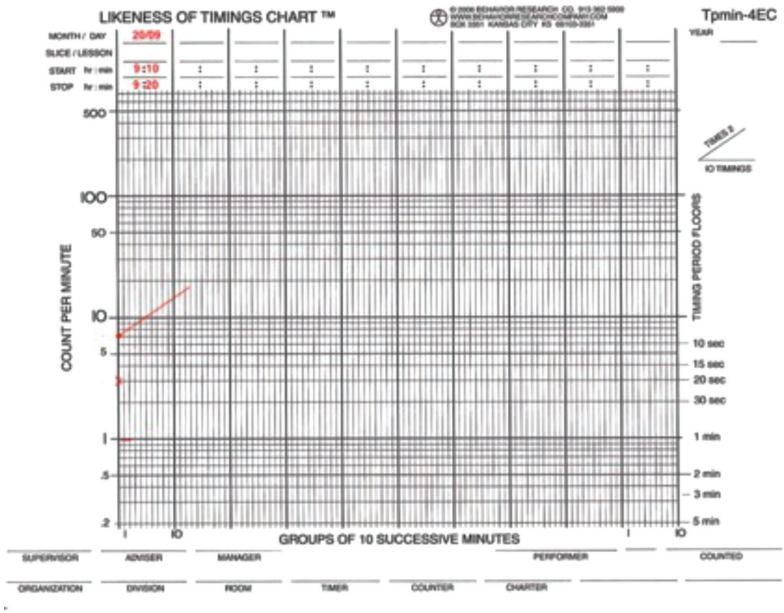

Figure 3

When the data are recorded and incorrect answers are quickly revised, a new test is taken. The data from the second test will be marked on the second vertical line, those from the third one on the

third line etc., until a session of 10 measurements is completed. The student's graph at the end of the session will probably look close to this:

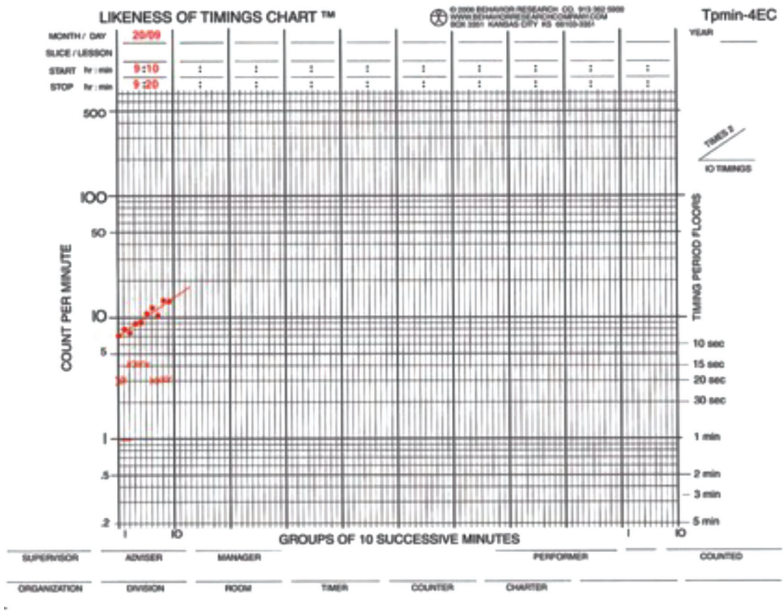

Figure 4

At the end of the 10 measurements, the data of the best test are recorded on the vertical line corresponding to the day of the test in the Daily Standard Celeration Chart. In this case, the best recorded value is 17 correct answers (and 1 incorrect answer) in 1 minute. From the corresponding point on the Daily Standard Celeration Chart, a line will be drawn that follows an acceleration 'times 2'. The vertical co-ordinate of the points of intersection of this line with each day of the week corresponds to the value of the answers per unit of time to be reached each day. The day intersected by the line corresponding to the value of the fluency aim is marked with an A and indicates the end of the intervention, i.e., the day of the achievement of the

fluency aim. This is what the Daily Standard Celeration Chart looks like for the student whose case we are imagining:

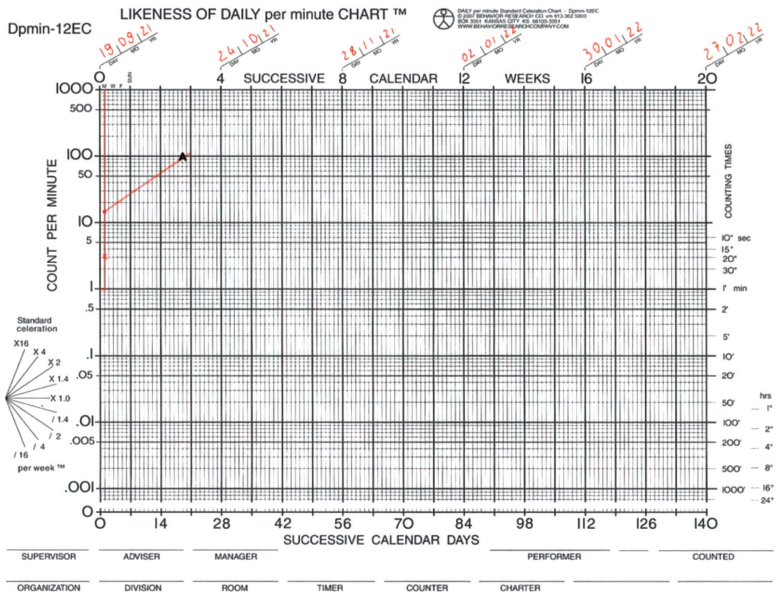

Figure 5

This technique makes it possible to make accurate predictions as to when the trained skills will be learned by each student and, in this way, to accurately plan the organization of the learning process throughout the year. If acceleration on subsequent days is shown to exceed the 'times 2' value, the end of the intervention is anticipated by drawing the new acceleration line and identifying the day when the fluency aim will be reached. If the learning decelerates, the intervention must be changed. Based on the graph in the figure, for example, it can be predicted that the student will reach the fluency aim (see/read 90 letters in 1 minute with 0-3 errors) on Friday 7 October 2021. However, if subsequent records show a higher acceleration (or if we

try and set a different acceleration target, e.g., 'times 4'), the fluency aim could be reached faster. In the same period, other tool skills or component skills could be practiced.

USING STANDARD CELERATION CHARTS IN THE CLASSROOM: DAYS AFTER THE FIRST ONE

The Daily SCC is then used on each of the following days at the start of each practice session to identify the rate of response target for the day. This value is then recorded on the tenth vertical line of a new practice period on the Timings SCC to indicate that it must be reached within the day's 10 readings. The first measurement is then taken. The rate is noted on the line of the first practice interval and joined with the point marked on the tenth line. Subsequent measurements should be along or above the segment joining the two points. If the goal of the day is reached before the end of the practice period, practice is concluded, and another activity can be carried out. Otherwise, practice continues until all students have completed the ten measurements in turn. The teacher intervenes at the end of the recording to check that the data have been recorded accurately, possibly by means of a new probe test. If the rate recorded by the teacher has a deviation of plus or minus 5 responses from the one independently recorded by the students, the recording is accepted.[25] This verification can also be conducted during the practice period, not necessarily at the end, with each pair. Furthermore, during the breaks between measurements, the students can be actively involved in a discussion of possible strategies to foster learning. The focus is in no way on competition, but on helping each other to improve with each new attempt compared to one's previous attempts. If this does not

25 Johnson & Street 2013: 113.

happen, the responsibility is taken over by the teacher, who analyses the test and changes it accordingly. In the case of special difficulties, the teacher can provide more direct guidance by means of very clear suggestions and the construction of several response opportunities in which these suggestions are progressively faded until the student's autonomy and fluency is achieved. The best data from each practice day are recorded on the Daily Standard Celeration Chart. The data of the behavior to be accelerated should lie along or above the already drawn acceleration line.

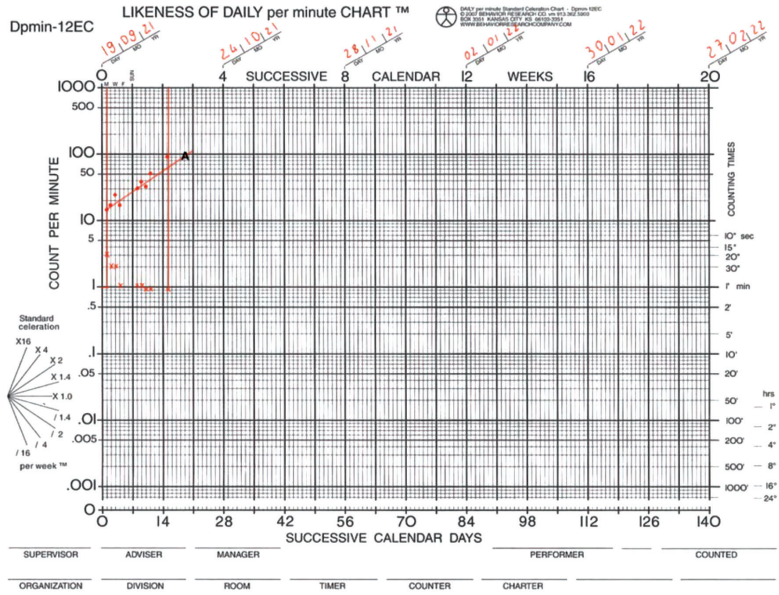

Figure 6

The data of the behavior to be decelerated should lie along or below the deceleration line. When the intervention is completed, the daily chart should look close to the one reproduced in figure 6. Note that the time boundaries of the intervention are marked with two vertical

lines at the start and end day respectively, the record floor with a dash immediately below the horizontal line corresponding to the 1 minute mark on the right vertical axis, the zero values at an indeterminate point below this line. In addition, the aim (A) was reached ahead of schedule. In this case, the intervention can be considered concluded without further practice and the teaching of other skills, mapped onto new Standard Celeration Charts, can proceed. New records will be taken at progressively increasing intervals to check the maintenance of fluency and to carry out short, spaced review sessions; records for more complex tests involving generative use of the acquired skills can be planned periodically to assess the distal effects of learning.

3.1.5 PHASE 5: REVIEW THE 'CELERATION' AND MAKE A DECISION

As mentioned above, when data are collected, it is possible to make decisions on how to proceed in terms of time management (i.e., scheduling the skills according to the acceleration shown by students compared to the expected acceleration) and how to intervene in cases where the expected acceleration 'times 2' is not achieved.

3.1.6 FOR AN *IN ITINERE* INTERVENTION: PRELIMINARY SKILLS ASSESSMENT

If the Teaching Technology is applied at an advanced stage of learning, when some skills that have not been fluently acquired need to be trained, the preliminary operation is called Comprehensive Skills Assessment. During this assessment, the rate of response for each of the curricular skills identified in the planning stages is measured and each value is compared with the fluency aim for that skill. Teaching will focus on skills that are not fluently mastered.

3.3 CURRICULUM BASED MEASUREMENT (CBM)

In the Technology of Teaching, the proximal measurement of skills through probe tests is combined with a system of direct distal measurement of behavior for the complex curricular skills that must be acquired by the end of a school year. These tests are administered at regular intervals during the school year, e.g., every fortnight, and make it possible to measure learning gains in relation to the objectives of the entire year and to identify the most functionally relevant skills, whose acceleration leads to the acceleration of more complex tasks. This assessment system is called *Curriculum Based Measurement* in the United States. A technique for the distal assessment of the skills to be acquired in Greek curricula based on the direct measurement of behaviour would have several advantages: it would accelerate the identification of key skills that need to be learned in Greek curricula; it would identify the different results generated by different teaching models and interventions; it would establish, at a national level, the stages of increasing complexity – understood as skills to be acquired and as tests capable of measuring them – to be achieved during high school and it would define a level of skills to be reached by the end of the entire curriculum, also in view of the final test for ancient languages included in the Italian State examination. At present such a system is not available, but its development may be one of the future directions of the research program on the extension of the Technology of Teaching to ancient Greek learning introduced in this paper.

4. EVIDENCE SUPPORTING THE TECHNOLOGY OF TEACHING

A comprehensive review of the evidence on the effectiveness of the Technology of Teaching, has been proposed by Kimberly Berens.[26]

26 Berens 2020: 165-182 and 195-200.

The main studies geared towards verifying its or Precision Teaching's effectiveness are the Project Follow Through,[27] the Great Falls Precision Teaching Project[28] and those conducted at Fit learning centers,[29] where the Technology of Teaching is applied to a variety of curricula, for students with and without a learning disability diagnosis. In these studies all the interventions "resulted in moving a distribution of achievement scores".[30] In the specific case of Fit learning, prior to the course the students had grades distributed in the lower tail of a 'normal', i.e., Gaussian, distribution, but "following 40 hours of instruction, those same learners had moved to the middle or upper quartile of that distribution".[31] In 40 hours, roughly the length of a school week, the gains were greater than what most American students make in an entire school year. From these results, it was derived that "normal [i.e., 'Gaussian'] distributions of academic achievement do not reflect natural variation in human aptitude; they reflect the outcomes of the instructional practices being used. A majority of students score average because, at best, traditional educational practices result in mediocre achievement".[32] Precisely because of the characteristic difficulty of learning classical languages, an empirically supported model of instruction could prove to be a useful tool for high school Greek (and Latin)[33] teachers. It could also be applied to any of the available

27 Berens 2020: 166-167.

28 Berens 2020: 167-168.

29 Berens 2020, 168-181.

30 Berens 2020: 181.

31 Ibidem.

32 Berens 2020: 181-182.

33 Although it has not been possible to include observations on the applications of the Technology of Teaching to the learning of Latin, this paper is part of a larger research project, which includes this kind of application, that will be presented in detail in future publications.

models of curricular content presentation:[34] in other words, with the support of any textbook, if the skills to be taught are analyzed in the ways described.

CONCLUSIONS

The model of the Technology of Teaching described and extended, in this paper, in support of learning processes involved in ancient Greek transcriptions decoding has been useful in other fields of instruction and may likely be useful in the field of ancient languages learning too. My own applications both in individual (for Greek and Latin learning) and classroom (for Latin learning) settings has had promising results. This Technology has also proved helpful with students who have been diagnosed with dyslexia: it may, thus, be of great help in contexts where learning difficulties are present. The tools it offers seem to be flexibly adaptable to diverse learning environments, mainly because they allow to change the intervention by responding sensitively to the actual performance and acceleration of the learners involved, directly measured through prolonged periods of time. As far as the teaching intervention efficacy is concerned, the Technology seems to provide the teacher with constant and accurate feedback on what is working and what is not, enabling them to change course when needed or to further improve the techniques that already work in the context in which they have been applied. Direct experience seems to show that pupils involved in the cooperative work required by the Technology of Teaching can experience pure fun when they accept the invitation

34 Among others, different curricular organizations for both Latin and Greek are provided in the following books intended for high school students or upper-level students, in both Italian and English: Agnello & Orlando 2006; Balme & Morwood 1997; Cambridge University Press 1970; Ørberg 1950; Proverbio, Sciolla & Toledo 1983; Sidwell & Jones 1986; Joint Association of Classical Teachers 1978.

to bring themselves to achieve their very best in a valued direction. However, the proposed extension of the Technology of Teaching to the process of learning to read ancient Greek transcriptions will need empirical evaluation in cooperation with a behaviour analyst.

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