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ROMA CHILDREN FROM SLOVAKIA
IN AN ENGLISH SECONDARY SCHOOL

How well does the school
meet the educational needs of the Roma children?

Thesis submitted for the degree of Doctor of Philosophy

Goldsmiths, University of London, April 2022

Volume 4

Appendix C: METAL (**M**odel of **E**fficient **T**eaching **A**nd **L**earning)

Vol 1: Chapters 1 to 10

Vol 2: Appendix A: Data files (Cases)

Vol 3: Appendix B: Notes and quotes (NAQ)

Vol 4: Appendix C: METAL

(**M**odel of **E**fficient **T**eaching **A**nd **L**earning)

Vol 5: Bibliography

**Lucia Kubalová
and
Klaus Bung:**

**METAL:
Model of Efficient
Teaching And
Learning,
or:
The No-Nonsense
Mechanisms of
Learning**

Kubalova_and_Bung_2020-05_-_METAL (Mk 10) 278 pp, 62,000 words

Lucia Kubalová and Klaus Bung:

METAL: **Model of **E**fficient **T**eaching **A**nd **L**earning**

or:

The No-Nonsense Mechanisms of Learning

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^==== 010-INTRODUCTION ==== STARTS

**^What makes METAL different
from other approaches to teaching**

METAL in a nutshell

All students succeed. ("All" is defined as 90% or more.)

Why?

1. Suitable subject.
2. Suitable method.

Suitable **subject** means:

- Easy enough
(i.e. student **can** learn it)
- Interesting enough
(i.e. student **wants** to learn it,
subject has been **agreed** with the student)
- Useful enough

Suitable **method** means:

- Explanations clear enough
- Time enough

Useful subject means:

- Can enrich his mind
- Can help him to earn a living
- Can help him to learn another skill
- Can benefit the student in some other way

To move from one chapter to the next, search for the ^, which is at the beginning of each chapter.

- ^010-Introduction - Why METAL
- ^020-A-Agreement, Negotiation
- ^030-G-Groundwork
- ^040-C-Conversation
- ^050-P-Practice
- ^060-R-Revision
- ^070-Examples from programmed books:
Skinner, Crowder, Gilbert
- ^080-Details of Practice Algorithm
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- ^110-Mopping up section

Note on gender:

Since "female" includes "male", "woman" includes "man" and "she" includes "he",

We are using the feminine pronouns also for generic purposes, so that "she" can cover "he", and "her" can cover "him" and "his", and "herself" can cover "himself".

METAL IN A NUTSHELL

<p style="text-align: center;">METAL</p> <p style="text-align: center;">aim: mastery, perfection</p>
<p>METAL-Groundwork:</p> <ul style="list-style-type: none"> • aim: understanding, • machine ("machine" is umbrella term for inanimate teaching system, book, computer etc) • strict sequence (step by step), • help along the way
<p>METAL-Conversation:</p> <ul style="list-style-type: none"> • aim: flexibility • people • spontaneous, random
<p>METAL-Practice (also called "R0: Initial learning"):</p> <ul style="list-style-type: none"> • aim: speed and perfection • alone with machine
<p>METAL-Revision</p> <ul style="list-style-type: none"> • aim: long term retention • alone with machine • method: timing, dynamics; manipulation of intervals • Intervals: oscillating between 20 seconds and 8 months • Dynamics means: <ul style="list-style-type: none"> - After mistake, reduce interval - After correct response, increase interval - (analogy: Thermostat on/off, on/off)
<p style="text-align: center;">Vision: Programmed modules in stock for all subjects and for all student needs</p>

WHY DO WE NEED METAL?

COMMON SENSE VS FASHION

The disputes among academics, the deliberately obfuscating language sometimes used, sometimes admired by groupies, sometimes imitated by would-be climbers, has shown that it is useful, or perhaps even necessary, to reduce the multitude of educational fashions and opinions to something that can stand up to common sense. Only with common sense can we, for example, remain clear-sighted enough, to resist the dust that is being thrown into our eyes, to resist the new fashions which sweep the academic world every decade or so and then become, for a while, the "politically correct" doctrine which every progressive teacher has to, and desires to, follow.

When describing the dialectics between my Roma students and their school, we have to compare the behaviour of both parties in terms of something that appears reasonable for the role they play and have to play in their environment.

In terms of the school, a mere description of the prevailing doctrine (or fashion if it is temporary) is not useful or informative enough, if we do not view it in comparison to something that is reasonable, transcends fashion, and stands up to common sense.

YARDSTICK

When a biologist measures the size of animals or their organs, she needs a yardstick for measuring. Similarly in looking at the actions of a school, we need not only to consider whether it conforms to the prevailing fashion in education, and we need not only to consider its actual behaviour (i.e. what it did), but also its potential behaviour (i.e. what it might have done). That puts the actions of the school into perspective and makes the description of the school informative. This is the reason why such yardsticks are also used in the description of physical objects. In police photographs, a knife is shown next to a ruler, and in news photographs an elephant or the corpse of a whale is shown next to a car, so that we can judge its size.

For this purpose, we have put together what stands up to common sense among the authors we have considered to create a common-sense model of the teaching process, which we have called METAL: **M**odel of **E**fficient **T**eaching **A**nd **L**earning.

METAL : COMMON SENSE

METAL utilises what remains when you pass through the filter of common sense reasonable theories as well as what is good in the sometimes exaggerated and sometimes obfuscating claims of opposing scholars.

COINCIDENTIA OPPOSITORUM

We have sometimes found instances of a *coincidentia oppositorum* (Nicolaus Cusanus, about whom the founder of System Theory, Bertalanffy, wrote his doctoral thesis). As a result, Skinner's principles of sound teaching (which guided us in designing METAL-Groundwork) fit nicely with the observations of Vygotsky about the way pupils gradually move from total incompetence in a particular skill, to learning it better and better with the assistance of teachers ("teacher" defined as anybody, including a machine, who helps a learner). The helping hand is most visible during METAL-Groundwork, but the progression (and therefore the development of mind) proceeds through all phases of METAL (up to the end of METAL-Revision) when long-term retention of full-mastery has been achieved.

NO "GRAND THEORY"

We justify each component of METAL not in terms of a "grand theory" (so rightly criticised by Karl Popper) but in terms of common sense, which does not go out of fashion as quickly as academic theories.

A summary of METAL

EACH COMPONENT OF METAL

We will now describe each component of METAL in turn, sometimes call it "a phase", sometimes a "a stage", as convenient. We shall give the justification for each, and indicate from where we have taken the inspiration or, in the case of the components affecting memory, detailed techniques, which cannot easily be improved or altered.

We will try to make the justifications, all of which are common-sense, as brief as possible. All of them could be expanded by more detailed arguments and defences against the misunderstanding of potential critics who will no doubt show up.

We must stress again, that we are not planning to defend the whole model, which would be meaningless, but only each component. We shall ask: Is this component better or worse than the possible alternatives?

It would be silly to ask whether cars are good or bad, but we can discuss whether a car with breaks would be better than a car without breaks. Similarly we can ask: Considering that no speed of progression in teaching suits all students equally, is it better to progress too slowly or to progress too fast?

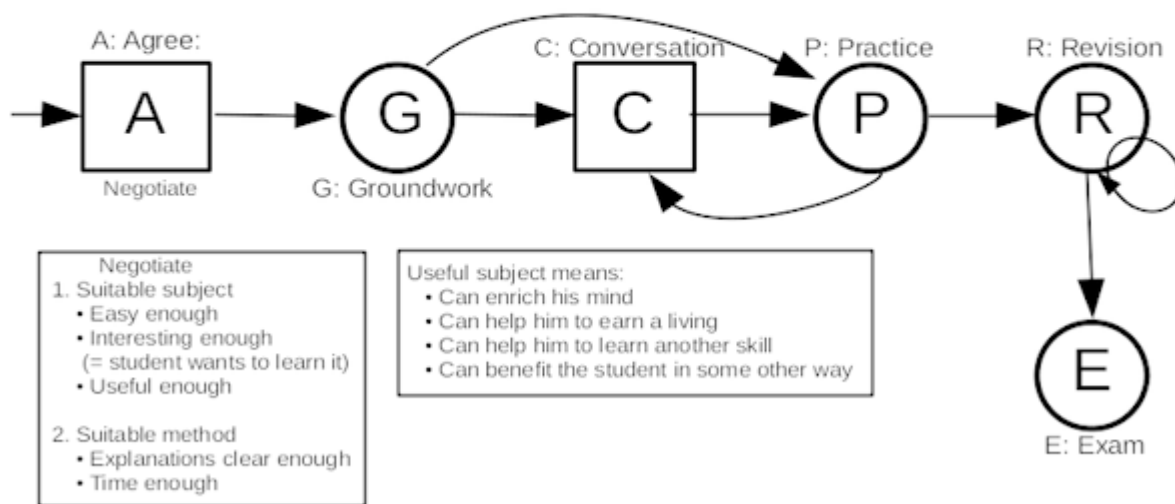
Similarly we can ask: If a student cannot read and write (or only badly), is it better to send her to a course which is designed to teach specifically reading and writing, or to let her mix with students who can read and write (in a class on some other subject)? Such questions have to be answered by common sense, since academic research can be helpful and should be carefully considered but, as we have shown elsewhere, it can seldom be blindly trusted, especially if it, or its authors, are popular. This applies particularly to education, which seems to be governed more by fashion than by systematic progress as do the sciences. (Decoo, Wilfried (2001): "On the mortality of language learning methods" (given as the James L. Barker lecture on November 8th 2001 at Brigham Young University). <https://csclub.uwaterloo.ca/~rfburger/On-the-mortality-of-language-learning-methods-wilfried-decoo-2001.pdf>)

^==== 010-INTRODUCTION ==== ENDS

==== THE COMPONENTS OF METAL ==== STARTS

Model for Efficient Teaching And Learning
METAL: a learner-centred system which
 redefines the function of the teacher

All students succeed. ("All" is defined as 90% or more.)



img 0033 Components of METAL (Mark 4.03), 600 px

METAL has six components:

A: Agreement (after negotiation)
 G: Groundwork
 C: Conversation
 P: Practice
 R: Revision
 E: Exam

The diagram img-0033 shows how they are related and how the student can move from one to the other.

A: AGREEMENT

A: Agreement guarantees that every student has the necessary **prior knowledge** to succeed in Groundwork and that what she does is **voluntary**. The **subject** (topic) chosen must be **suitable** for the student. That means it must satisfy the following conditions:

1. The subject must be **easy** enough. If a subject is too difficult, then, by definition, the student cannot possibly succeed. Letting him take such a course, or, worse, forcing him to do it, means setting him up for failure. This is not

only pointless, but criminal, because it means damaging him for life, since failure discourages future learning, whereas success breeds success.

Another way of expressing this principle is: "**Find the right starting point**", in Russian this is "ZPD" (Vygotsky), but it is simpler and clearer in English.

2. The subject must be **interesting** enough, i.e. the student must **want** to learn it. Failing on this point will almost inevitably lead to failure. You cannot force a horse to drink. You cannot force a student to learn. The classic example are the two Roma students who were kept in detention in order to learn something and who, in defiance, simply buried their heads in their arms. This is the case of "learning impossible".

A more common, and therefore important, case is students who are indifferent to the subject and who have to be continuously **persuaded** to learn, **tricked** into learning ("motivational" tricks), rather than being motivated by curiosity and the subject itself. This is an almost universal situation in schools, and a great deal of **time** is **wasted** because of it. Students who **want** to know the **subject for its own sake** will learn much faster. Teaching students who have to be continuously persuaded is like dragging a cart through sand rather than pulling it on a paved road.

It is like the white (non-Roma) man's cart in Nikolaus Lenau's poem about the "Three Gypsies" discussed in NAQ-15 (Roma in fiction and journalism)

Drei Zigeuner fand ich einmal Liegen an einer Weide, Als mein Fuhrwerk mit müder Qual Schlich durch sandige Haide.	Once I saw three gypsies Leaning against a willow tree When my cart in tired toil Crept through the sandy heath.
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3. The subject must be **useful** enough. Instead of "useful" we could say "beneficial". We distinguish four categories of usefulness. Any one of these would make it worthwhile to learn or teach a subject:

(a) It can enrich the mind. This may be poetry, literature, music, the visual arts. It may be absolutely anything that may fascinate a child. It could be mathematics, engineering, space travel, astronomy, cosmology, medicine, religion(s), ... The category of enriching is the most comprehensive and important because it can ensure the happiness of the child when all the other categories of "usefulness" fail. Money can be stolen from the child, she can lose her job, but enjoyable knowledge is always hers.

(b) It can help her to earn a living, e.g. to find a job, to become self-employed, to work in the gig economy, to do

anything to earn money; to move up to an apprenticeship or a university degree.

(c) It can help her to **learn another skill**. This is something she has to master before she can embark on another course.

Examples:

Literacy: For most subjects that are taught at secondary school she must be able to read and write. So if the student says she is interested in history, or in modern oil pirates, or in great dictators but cannot read and write, she has to be offered a course in literacy training (using methods and topics which she will find attractive, as I have explained in NAQ-11 (An immodest proposal for getting the little buggers to read and write). If she is from Slovakia and does not speak **English**, but wants to participate in some of the classes of the English school, then the most efficient way is for her to spend a few months on a carefully programmed English language course where she **actively learns** the language. This is far more efficient than letting her sit with the other English students in classes in which she understands hardly anything. In such classes she will learn neither English nor the subject being taught. The fate of the Roma in the research school have shown that over and over again.

If she wants to study **engineering**, she will have to learn some **mathematics** first, even if, perhaps, to start with she does not really want to study mathematics. This is the task of establishing the required **prior knowledge**.

During the consultation at this phase, an approximate **plan** will be established of a number of subjects that are required to reach a certain goal (and the sequence in which they have to be tackled), a network of subjects as suggested by Vygotsky.

(d) Any other benefit that the student may see.

4. The **explanations** must be clear enough. That is another way of saying that the teaching must be effective. It is a waste of time to have a student sitting in a class where, for whatever reason, she does not understand the teacher.

The specifications of METAL-Groundwork ensure that this is always the case. ("Always" is defined as 90% or more of all teaching steps.)

5. **Time enough**: The student must be given as much time as she requires. In traditional schooling this is hardly ever the case. METAL guarantees it: Every student learns at her own pace. Many students are turned into failures by conventional school because they are not given the time they require; i.e. because the teaching is bad. Teaching which does not

lead to success is bad teaching. Failure to learn is always the fault of the teacher!

- **G: Groundwork** - In this phase, the student learns the basics of the subject she wants to study. This phase ensures that she has the prior knowledge necessary for a conversation and other activities with the teacher and with her peers. Groundwork leads to understanding and is as elaborate as required for this purpose, often very elaborate. The groundwork lessons are child-centred, are one-to-one, and are delivered by machines, using the principles of programmed instruction (Skinner and Gilbert style). (I use the word "machine" [2 syllables] to denote what Frank calls "Inanimate teaching systems" [8 syllables]. It covers computers and programmed books.) Each module is designed to take 15 minutes for the average student. The design principles for this phase are discussed in detail below. Phase **G** aims at understanding, not at fluency.

This phase consists of modules presented on computers or programmed workbooks and ensures that every student masters the basics of the next topic she wants to study.

- **C: Conversation** - During this phase the student can interact informally with the teacher, with her fellow students and other students. All aspects of learning and all subjects which are not suitable for the techniques of Groundwork are covered here. Having **G** before **C** ensures that the teacher does not waste her time with entirely ignorant students and that the students are not frustrated by being unable to participate actively in a lesson with the teacher and fellow students.

The conversation phase is the teacher's domain. It leads to flexibility. It is a space for interaction between student and teacher and among students. It also covers aspects of skills which, by their very nature, can not be programmed (i.e. not be fully covered in Groundwork), e.g. creative skills, discovery, etc.

We have drawn **C:Conversation** like a square. Imagine it as a park, the playground, an open or covered space, a park. Imagine it like Plato's Academy in Athens, his peripatetic school, where students and teachers were walking about while discussing subjects of interest.

Imagine it like the school for Jewish students of theology in a Polish village in the film Yentl. The students, all very eager to learn and to become masters of their subject, argue passionately with each other about the books which they have read. Such customs lead to profound knowledge, eliminate initial confusions, and ensure that a student cannot easily be shaken in what he has learnt. It would be great for something like this to happen in the METAL-Conversation phase.

In that Yeshiva (Jewish school of theology) the students are encouraged to study in pairs, so that they encourage each other and help each other. That is also a practice to be encouraged. It would work well in the research school if its foundations were not so chaotic. A printed version of the Yentl story can be found in: Isaac Bashevis Singer (1903-1991): "Yentl, the Yeshiva Boy", in various collections of Singer's short stories, but for the scene of the students debating, you have to watch the film.

- **P: Practice** - During this phase, the student uses a learning algorithm which controls exactly each step the student has to take to reach mastery with the minimum number of steps. It is learner-centred and is the very opposite of drill. All practice is based on the METAL-Catechism. The aim of practice is speed and perfection. From Practice the student can return to Conversation or immediately move forward to R:Revision. Eventually the student is obliged to move forward to Revision.

The Catechism is designed for purely factual subjects (e.g. history, geography, foreign languages, spelling, and factual parts of many others).

The techniques of **P** lead to fluency and short-term retention. In some cases, the student may chose to move from **G** directly to **P** before going to **C**. This will make her a more fluent, more competent, participant in the interactions happening in **C**, and make **C** a more joyful experience for her, which is often not the case in traditional classroom instruction, especially for those students who, with traditional methods, perform less well. In METAL, all students can successfully participate.

The Practice and Revision phases utilise workbooks called "catechisms". For every Groundwork module, there must be an equivalent METAL-Catechism, which contains the essentials of the Groundwork lesson in a question-and-answer format. The catechism converts knowledge into skill, the skill of answering questions.

The catechism can be used during the conversation phase, but it is essential for Practice and for Revision.

Groundwork ensures that the student has the prior knowledge required for a conversation with the teacher and her fellow students.

- **R: Revision** - The Revision phase stretches the short-term retention achieved during **P** to four months' retention of 90% by precisely timed revisions. The principle is: Revise as little as possible, but as often as necessary.

The revision algorithm prescribes 8 revisions distributed at

changing intervals, distributed over 8 months. During this phase the student uses the same catechism which she used during the Practice phase.

Note how we have progressed, in the same subject matter, from Understanding (Groundwork phase), to Application and Interaction (Conversation phase), to Speed and Perfection (Practice phase), to Retention (Revision phase). Each of these phases ensures that the student has the skills requisite for the next phase.

- **E: Exam** - The student is ready for any exam. The distributed and carefully planned revisions during phase **R** ensure that there is no need for any nerves and last minute cramming. It also ensures that what the student has learnt is not forgotten immediately after the exam but retained until it is needed in practice or can be easily re-learnt. The model does not accept any large number of failures. It combats them systematically.

DEFENCE AGAINST CRITICS OF SKINNER: METAL IS NOT SKINNERIAN AND NOT BEHAVIOURIST

Even though METAL-Groundwork uses some principles of which Skinner approved, METAL-Groundwork (and METAL as a whole) are **not behaviourist**. Behaviourists are interested only in creating correct **words**, verbal responses, whereas it is the declared function of Groundwork to nourish **understanding**, a product of **mind**, something that Skinner, who denied the existence of mind, could not even conceive.

Let me remind anyone who wants to dismiss METAL and especially METAL-Groundwork on the grounds that it is Skinnerian and Skinner's approach to teaching is **robotic**, that **METAL is much more than Skinner**, much more than classical programmed instruction. Skinner wanted to "shape behaviour", METAL is designed to **enrich the mind**. That is its highest goal. For METAL, enriching the mind is even more important than teaching the students how to become rich, i.e. make a lot of money. But both are sometimes possible at the same time.

REMEMBER:
GROUNDWORK DOES NOT CARE ABOUT WORDS
BUT CREATES **UNDERSTANDING**.

WHY ARE GROUNDWORK MODULES DELIVERED BY MACHINE?

Why are groundwork lessons delivered by machine and not by teachers? ("Machines" is our umbrella term for programmed books and computers.)

1. Because machines are **more efficient** than teachers (= They achieve better results than teachers). Reason: Unlike

teachers, the performance of machines can be systematically **tested and improved** until the machine produces the desired results. ("**engineered** performance")

2. Because, once a programmed module has been shown to produce the desired results, it can be inexpensively **distributed** to thousands of schools. (The performance of the modules can be **scaled (cloned)**, i.e. the modules can be **cloned**. Teachers cannot be cloned. Their performance tends to be worse, and they are much more expensive.

Groundwork modules **prepare** the students for **conversation** with the teacher. The teacher can take it for granted that the students have mastered the contents of the Groundwork modules.

WHY ARE CONVENTIONAL TEXTBOOKS NOT SUITABLE FOR GROUNDWORK?

Most conventional textbooks do not adhere to the principles of efficient teaching discussed in my description of Groundwork. E.g. they do not have small teaching steps, they do not demand frequent responses, they do not offer immediate feedback (confirmation of results), their efficiency has not been tested, they do not guarantee results.

That is the reason why, traditionally, **teachers** are used to make up for the shortcomings of traditional textbooks. This is a wasteful and demonstrably inefficient way to deal with **inadequate textbooks**. METAL's solution is more rational and much cheaper. Instead of supplementing inadequate textbooks by teachers, METAL **improves the textbooks** by turning them into programmed modules (with principles as defined below).

^==== 020-A-AGREEMENT AND NEGOTIATION ==== STARTS

A: Agreement and negotiation - This step ensures that only students with the necessary **prior knowledge** are admitted to a Groundwork course. Reason: Students without the necessary prior knowledge are bound to fail. Students without the requisite prior knowledge will be routed to courses which fill their **knowledge gap**. All students can be successful if they are studying courses which are suitable for them. Unsuitable courses guarantee failure. It's usually the courses that have failed, not the students.

When this decision has been made, she is sent to "**G**-Groundwork" to learn the basics of the first subject on her **chosen curriculum**.

Message for headteachers

If you want a student to succeed,
put her into a course which is suitable for her,
not into one in which she is bound to fail.

^==== 020-A-AGREEMENT AND NEGOTIATION ==== ENDS

^==== 030-G-GROUNDWORK ==== STARTS

^METAL-Groundwork

DELIVERY BY MACHINE

All Groundwork lessons are delivered by machine. "Machine" is our umbrella term which covers what Frank calls "inanimate teaching systems", which was called "teaching machines" in the programmed learning tradition, and today in particular books and computers. The activities covered by METAL-Groundwork are child-centred and can also be described as self-instruction.

TEN REASONS WHY GROUNDWORK LESSONS ARE DELIVERED BY MACHINE?

1. Because they teach more efficiently and reliably than live teachers.
2. Because they are more child-centred than teachers.
3. Because every student can have her own teacher (machine teacher) (one-to-one instruction for everybody).
4. Because the student can be taught exactly the skills she requires.
5. Because when the student leaves the Groundwork phase in any particular topic and enters the conversation phase, she is better equipped to participate in the teacher-inspired activities taking place there.
6. Because when in the Conversation phase, she is less likely to waste the teacher's time through her ignorance or incompetence.
7. Because Groundwork guarantees that the learner has at least a minimum amount of knowledge (skill) and that her future career can not be ruined by an ambitious and progressive teacher who is more concerned with the currently fashionable ideology than with the future welfare of the learner.
8. Because teaching programmes are cheaper than teachers.
9. Because effective teaching programmes can be used again and again, year after year, at minimal cost.
10. Because effective teaching programmes developed in one school can be used in hundreds of schools all over the country.

WHY DO GROUNDWORK LESSONS TEACH MORE EFFICIENTLY THAN LIVE TEACHERS?

1. They are better prepared.
2. They are written for a target population (intended learners) with a specified prior knowledge.
3. They are systematically tested and improved, like any other product of technology (like computer programs, washing machines, cars, vacuum cleaners). When they break down, the engineers do not blame the user but blame themselves and improve the machine until they can guarantee the required result.

Similarly a teaching programme can guarantee results.

All Groundwork modules (small lessons) are teaching programmes which conform to the traditions of programmed instruction, in the styles of the best of its practitioners and their variants, e.g. Thomas F Gilbert with an element of Skinner. They conform also to the principles of Vygotsky and other good practitioners.

WHY ARE THE GROUNDWORK MODULES DESIGNED TO HAVE AN AVERAGE WORKING TIME OF ONLY 15 MINUTES

Because it is better to have lessons which are too short than having lessons which are too long. If a student has the energy to continue studying, it is easy for her to study a second and third module until she is tired.

By contrast, if the modules had an average duration of 45 minutes, they would be too long for slow students, and it would be much more difficult to cut the lesson short and re-start in the middle of the same module at a later date.

DO GROUNDWORK MODULES TAKE THE LEARNER TO MASTERY (IN VYGOTSKY'S SENSE OF THE WORD)?

No, they aren't meant to do that. They take her up from a comparatively low level of part-mastery to a higher level. The student receives a lot of assistance while in Groundwork. In the subsequent phases of METAL, she advances further in her level of skill (i.e. needs less and less assistance, which can be measured in terms of a vector each component of which is a variable indicating her state of achievement).

Each phase of METAL makes the learner more efficient and her skill more reliable. All the phases of METAL deal with the student in a state of part-mastery, not full-mastery. Only when she has passed the test at the end of Phase R-Revision which certifies 8-month retention, has the learner achieved full-mastery.

METAL assumes that a skill only "counts" if the student retains it, i.e. if it cannot quickly "evaporate".

We have been asked: Why are you not referring to Vygotsky's concept of ZPD in this description? Why do you not say that the student is inside the ZPD in all the phases of METAL?

Because the term ZPD is misleading and meaningless. There is no such thing as ZPD, it is a fantasy, a phantom, like the Emperor's New Clothes. By contrast, the concepts of part-mastery and full-mastery, which can be measured in terms of Frank's variable P, are crystal clear and do not require any transcendental or mystical interpretation.

^PRINCIPLES OF GOOD TEACHING

PROGRAMMED INSTRUCTION AND B F SKINNER

METAL-Groundwork follows principles which came first into widespread use in the 1950s and 1960s in the "programmed instruction" movement, a form of self-instruction. It was inspired by the research of behaviourist psychologist B F Skinner (1904-1990). He was at the height of his fame at the time. His techniques were very effective, especially in education. He was fiercely critical of teaching practice in traditional classrooms.

SKINNER'S CRITICISM OF TRADITIONAL CLASSROOM PRACTICE

"Even our best schools are under criticism for their inefficiency in the teaching of drill subjects such as arithmetic. The condition in the average school is a matter of widespread national concern. Modern children simply do not learn arithmetic quickly or well. Nor is the result simply incompetence. The very subjects in which modern techniques are weakest are those in which failure is most conspicuous, and in the wake of an ever-growing incompetence come the anxieties, uncertainties, and aggressions which in their turn present other problems to the school. Most pupils soon claim the asylum of not being "ready" for arithmetic at a given level or, eventually, of not having a mathematical mind. Such explanations are readily seized upon by defensive teachers and parents. Few pupils ever reach the stage at which automatic reinforcements follow as the natural consequences of mathematical behavior. On the contrary, the figures and symbols of mathematics have become standard emotional stimuli. The glimpse of a column of figures, not to say an algebraic symbol or an integral sign, is likely to set off, not mathematical behavior, but a reaction of anxiety, guilt, or fear.

The teacher is usually no happier about this than the pupil. Denied the opportunity to control via the birch rod, quite at sea as to the mode of operation of the few techniques at her disposal, she spends as little time as possible on drill subjects and eagerly subscribes to philosophies of education which emphasize material of greater inherent interest. A confession of weakness is her extraordinary concern lest the child be taught something unnecessary. The repertoire to be imparted is carefully reduced to an essential minimum. In the field of spelling, for example, a great deal of time and energy has gone into discovering just those words which the young child is going to use, as if it were a crime to waste one's educational power in teaching an unnecessary word. Eventually, weakness of technique emerges in the disguise of a reformulation of the aims of education. Skills are minimized in favor of vague achievements - educating for democracy, educating the whole child, educating for life, and so on. And there the matter ends; for, unfortunately, these philosophies do not in turn suggest improvements in techniques. They offer little or no help in the design of better classroom practices." (Skinner 1954) (My emphases)

Note the word "aggressions", to which we shall return under the heading of "behaviour".

Skinner, of course, was not the only person who has, over the years expressed dissatisfaction with the performance of schools, to wit titles such as

- Goodman, Paul (1964): "Compulsory miseducation". Horizon Press
https://en.wikipedia.org/wiki/Compulsory_Miseducation
- Holt, John (1964 and 1982): "How Children Fail". Penguin Education
- Freire, Paulo (1970): "Pedagogy of the Oppressed". Continuum Publishers, New York and London
- Illich, Ivan (1971): "Deschooling society". Harper & Row, New York
- Cox, C B, and Dyson, A E (1971): "The black papers on education". Davis-Poynter, London
- Phillips, Melanie (1996): "All must have prizes". Little Brown, London

Skinner developed a philosophy about human nature and the ideal society (Skinner 1948, 1971) which were later discredited (see Chomsky-Skinner dispute in NAQ-02 (In defence of Skinner)). We are not concerned with this dispute.

It is still convenient to call the principles of programmed instruction "Skinnerian". Most of them can today be regarded as plain common sense, and we are defending them as such. We can do so without being regarded as a rabid Skinnerians or naïve behaviourists. We do not, like Skinner, regard MIND as a dirty four-letter word.

DIFFERENT STYLES OF PROGRAMMED INSTRUCTION

During the heyday of the programmed instruction movement, several variants of lesson design came into being. We will only mention two of them, the Gilbert style (Thomas F Gilbert) and the Crowder style (Norman A Crowder).

Reduced to their essentials, these three styles compare as follows:

SKINNER (LINEAR)

Skinner: linear: small steps in a single line, many details specified. No more needs to be said here. We will discuss the features of this style in detail below.

GILBERT

Gilbert: The underlying psychology is largely the same as Skinner, but Gilbert does not make an issue of psychology; he focusses in great detail on immediate results.

Gilbert features are:

- Primarily interested in vocational and industrial training, not in schools
- Lesson preparation: same as Skinner,
- but striving at even greater technical perfection and discussing in detail how to achieve it
- Often starts with Subject Matter summary in the form of charts. He is less concerned with facts than with procedures (chains of actions).
- Content of charts can be absorbed (learnt) by Skinner-style teaching steps.
- Unlike Skinner, not concerned with philosophy, but ruthlessly concerned with results. (Industry, or the military, cannot afford to fail, schools do so habitually.)

CROWDER (BRANCHING)

Norman A Crowder (about whom it is difficult to get any information) was a psychologist who worked for the US Airforce.

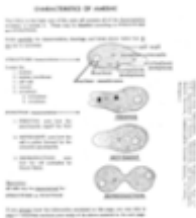
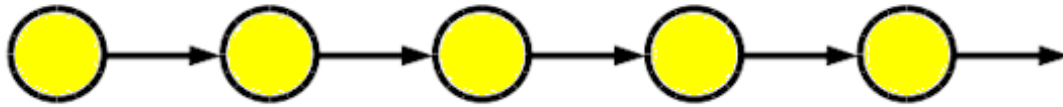
Crowder features are:

- No psychological baggage
- Larger steps, which anticipate common or likely mistakes
- Diagnostic multiple choice question at the end of each teaching step
- Lesson then branches to steps which try to clarify the misunderstanding

Schools can benefit from all three approaches. Which approach is best depends on the kind of student for whom the lesson is intended and on the subject matter (facts, procedures, complex relations, etc.). Techniques which have been successfully used by industry or by the military inspire me with confidence because, unlike schools, they cannot afford to fail: I do not want my Roma children to continue failing.

Skinner vs Gilbert vs Crowder

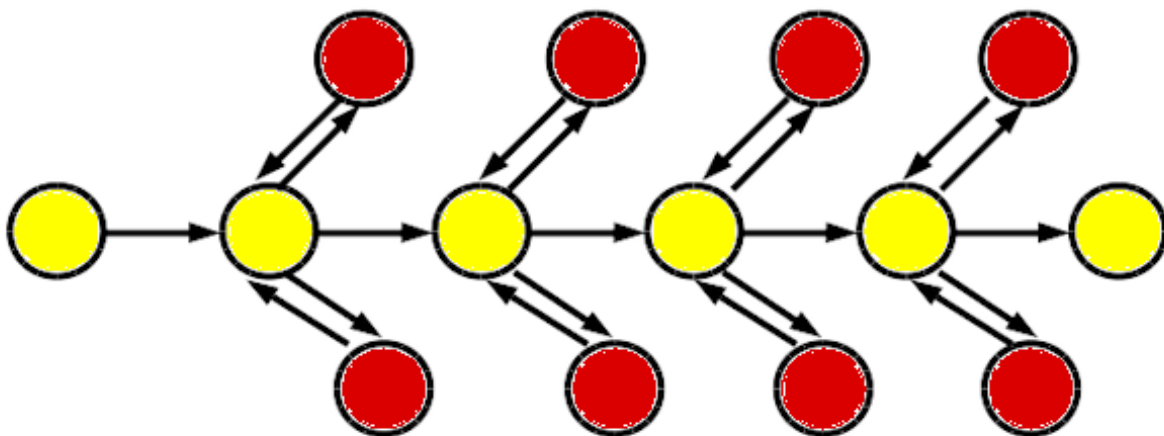
Linear programme



Gilbert programme



Branching programme



(img 0021 Skinner vs Crowder vs Gilbert mathetics comparison)

PRINCIPLES OF SOUND TEACHING AND LEARNING (AS EXEMPLIFIED IN PROGRAMMED INSTRUCTION)

ESSENTIAL FEATURES OF A SKINNERIAN TEACHING PROGRAMME (= PROGRAMMED LESSON SKINNER STYLE)

PRIVATE LESSONS

Every student learns on her own, i.e. has her own "teacher", in the shape of a computer or a programmed book, not a live teacher.

TARGET POPULATION

The teaching programme is designed for a specific target population. The prior knowledge of the student and the contents of the programmed lesson have to be matched. The lesson must not use words and concepts which the student does not understand, or examples in which she is not interested (!) or a style of language which is too complicated or abstract for her. The teaching steps must not be too large (i.e. the progression must not be too rapid). At lesson which works at Eton will not necessarily work at the research school.

SELF-PACING

Every student learns at her own speed. She can take as long over a lesson as she likes. This is impossible when a group of students is taught by one teacher.

SMALL TEACHING STEPS

The lesson is divided into small parts, called teaching steps, often consisting of only one or two sentences.

CONTINUOUS CHALLENGES

At the end of every teaching step the student has to do something, e.g. answer a question in writing, or fill in a gap in a sentence, carry out a task (e.g. a chain of operations) to prove that she has understood the new information. This means that the student is kept active all the time. A live teacher cannot do this in the classroom.

This very important feature is missing in most textbooks and online courses.

IMMEDIATE FEEDBACK

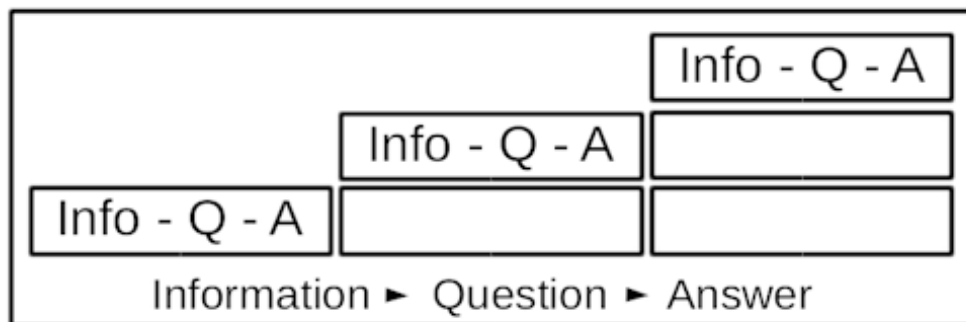
After each response, the student is shown the correct answer, i.e. she is told whether she was right or wrong. (This feature is called "confirmation of response" or "feedback" or "reinforcement".) This is very important to keep up motivation and for successful learning. A live teacher cannot do this since different students will give different answers.

This feature is missing even in courses which contain exercises with model answers. Teaching is less effective if the student is not told immediately after every answer whether she was right or wrong.

SMOOTH UPWARD PROGRESSION

The progression from one step to the next is so slow (gradual, not steep) that every student can easily take it. A live teacher hardly ever does this. Many of her good students will get bored if the steps are too small. The less gifted students will be lost if the increments are too big.

With a computer, good students can move on fast when the increments are small. Less gifted students can take the same steps more slowly. But no student is defeated by them.



(img 0016 Teaching steps, info Q A, 500)



(img 0018 Steps, front house, big vs small, 225x225)

In this way the student is safely led from her initial state to her target state.

HOW THE PROGRAMMES ARE TESTED (DEBUGGING THE PROGRAMME)

TESTING: STAGE 1

The first draft of a programmed lesson will be given to one or two students of the target population to work through. They write down all their answers. The programmer (author of the programmed lesson) analyses all their mistakes. Most of these mistakes are her mistakes. She blames herself, not the students. Perhaps her explanation was confusing, perhaps she assumed prior knowledge which the students did not have, perhaps she moved ahead too quickly from the last teaching step, perhaps she used a word or concept which needed detailed explanation.

The programmer can also ask the student why she made certain mistakes. Thereby she can detect a weakness in the programme.

It is rare that a traditional teacher blames herself when the student makes a mistake.

The two test students (guinea pigs) have now brought to light at least the most obvious mistakes of the programmer. The programmer amends the faulty teaching steps as best she can. Now the hunt is on for the smaller weaknesses.

A live teacher cannot improve her lessons in this way. Why?

1. She will not have to teach the same topic again for another year.
2. She never gives exactly the same lesson twice. She is not reading from a script. Her explanations will be fixed only

in outline. But in effective teaching, **every word** matters. The programmed lesson tries to find exactly the right words.

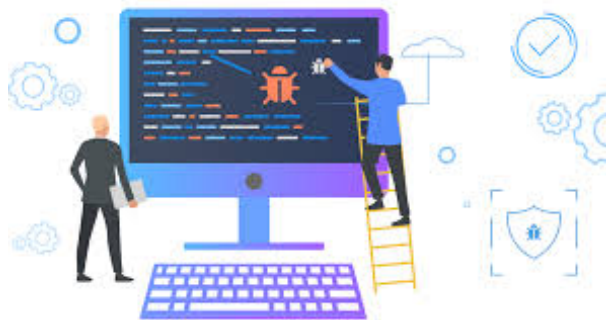
TESTING: STAGE 2

She now tests the programme with a bigger group of students, say ten. They, she hopes, will bring some of the smaller mistakes (of the programmer) to light by making (welcome, LOL) mistakes.

More students will make more, and different mistakes, and the programmer can consider to what extent they are her fault, and where she should amend her programmed lesson.

She will make the necessary changes as best she can.

There may be more such tests. The programme will be changed and tested until it produces the desired results. A computer programme is developed in a similar way. Finding faults (bugs) in it is called "**debugging**".



(img 0020 Debugging, 299)

TESTING: STAGE 3: LARGE-SCALE TESTING

The new version of the programme is now given to a larger group of students, say 30, 100, or more. It depends on the resources available to the programme developer. (See also below on Gilbert style programmes which tend to be rigorously tested.)

POST-TEST

At this stage, statistics of sorts can be made. There will be a post-test. It determines how much the students have learnt. By comparing it with the pre-test (the test given before the students started work on the programme), we can see how the state of knowledge of the student has moved from its initial state P_i to its final state P_t . Traditionally one expects 85% of the students getting 85% of the answers right. So that's what one can expect the programme to guarantee when used by the same kind

of students (target population). To achieve this regularly, the programme does, of course, have to be systematically improved.

In METAL we expect better results because "Groundwork" (Programmed Instruction) is only the initial phase. For METAL, the two subsequent phases, Conversation, and Practice, are vital; they aim at an end result of 90%, starting with the output of Programmed Instruction.

WHAT IS MEANT BY GUARANTEE? HOW THE STANDARD IS MEASURED

People often assume that a guarantee means that a certain result will happen with 100% certainty; e.g. a washing machine with a one-year guarantee will not break down. This is a misleading assumption. All guarantees are given (or calculated) with a certain probability, and that probability is never 100%. 100% is literally **impossible**. 99.9% is **almost** impossible. The lower the probability **P**, the easier it is to achieve. Guarantees are given with a certain probability. Even a guarantee with $P = 50\%$ or $P = 10\%$ is a guarantee. A washing machine with a 10% means that 10 machines out of a 100 machines will work: that is better than a guarantee of 1%, which means that 1 machine out of 100 will work. The guarantee does not mean that machines will not fail, but that those which do fail will be replaced free of charge.

In METAL we also have arrangements that tasks on which a student fails will taken into "special measures" or "intensive care", which will ensure that the guarantee is not breeched. More about this can be found in the section on "Revision".

When we say that the target standard for an exercise or lesson is 90%, we say that the system is designed in such a way that everybody carrying out the instructions to the letter will be able to answer 90 of 100 questions correctly. By the same token, if 100 students are confronted with the same question, 90 of them will get the answer right.

We keep repeating this in our text because we cannot be sure that non-mathematical readers will interpret the word "guarantee" correctly.

OTHER STYLES OF PROGRAMMING

These are the principles of good teaching. Even common sense recognises them as such. Research arising out of Skinner's work has underscored many of them. (Lumsdaine & Glaser 1960). Other styles of programming adhere to them to a greater or lesser extent.

GILBERT STYLE PROGRAMMES (MATHETICS) (SIC!)

Gilbert style programmes (to be discussed below) strongly adhere to them, and I therefore need not repeat them in connection with Gilbert. To some extent, Gilbert is even more rigorous than Skinner, and that is commendable. To some extent, Gilbert gives the programmer more freedom than Skinner. For instance, he does not insist on tiny teaching steps, or on any specific format for teaching steps. His style of programming was originally designed for professionals, e.g. engineers, repair manuals, etc., but should work equally well for some school students. With Gilbert, everything depends on the results. Teaching steps can be made bigger if that produces better results with the target population. Gilbert programmes have been successfully used with high school students for the teaching of mathematics. (Kumari, 2014).

Gilbert is also an advocate of good diagrams. He sometimes uses a Skinner style programme to take a student through a one-page diagram depicting a complex procedure. (See examples below). We can assume that the Skinnerian principles discussed above apply to these programmes combining a large diagram with step-by-step instructions.

^==== 030-G-GROUNDWORK ==== ENDS

^==== 040-C-CONVERSATION ==== STARTS

C: CONVERSATION PHASE

This is the domain of the teacher.
This is where the teacher can shine.

PROBLEM SOLVING AND CREATIVE TASKS APPLYING ELEMENTARY SKILLS TO REAL LIFE

Motto:
"What is best in mathematics
deserves not merely to be learnt as a task,
but to be assimilated
as a part of daily thought,
and brought again and again
before the mind
with ever-renewed encouragement."
(Bertrand Russell,
The study of mathematics, 1902)

TEACHER-LED ACTIVITIES

TEACHERS VS PROGRAMMED INSTRUCTION: DIFFERENT ROLES

Programmed Instruction can ensure that the children learn all the essentials. The teachers can guide them and help them find the best programmed lessons and to tackle them in the correct order.

SOME SUGGESTED TEACHER ACTIVITIES

Once the students have learnt the basics, from programmed lessons, the teachers can:

- organise different activities (e.g. in groups) which show the students how to use the basic skills they have acquired in different contexts and environments. There should be no "worst" students among them. All students should have mastered the basic skills with a 90% probability.
- encourage creative and social activities which are good for the children. This is truly child-centred learning. The open-space layout of the research school is ideally suited for such a flexible approach but is obviously not now used in the best way. That's why one of the teachers described the set-up as hellish.
- encourage the children to work in teams (groups).
- give better children incentives to work as mentors for weaker ones.

- organise competitions (matches) where teams of students compete with each other in trying to answer the questions on the quiz-cards (like a pub quiz), or in workbooks, etc.
- give the children Quiz Cards (Exercises in the A6 format) with questions and answers, or other tasks, which they can practise at home. This is not "homework" (which children would resist) but tools for making better progress with their activities on the following day.

There is no limit to the activities the teachers might think up at this stage.

STRICT SEPARATION OF "GROUNDWORK" AND "CONVERSATION"

What is special about this phase (Conversation) and why METAL has separated it from the "Groundwork" phase is that it deliberately bars teachers from the activity which has been their main task in the past and in which traditionally they tend to fail. In the METAL model, the teachers can take it for granted that the students have the basic skills.

MAKE STUDENTS ***WANT*** TO BE GOOD

School and teaching has to be organised in such a way that the students want to be good. At present this is not always (not often?) the case. The set-up of the school often militates against learning. This becomes apparent when one compares the provisions of METAL against reality in the research school.

REMARKS ON TERMINOLOGY:

- Subject matter summary: Different formats are: Workbook (Collection of Exercises), Quiz Cards, Exercise (collection of tasks), Flash Cards, Computer program
- Task (either a simple question/answer operation; or a chain of operations, as in a mathematical task)
- Knowledge, Skills, Tasks, Question/Answer (Input/Output, Stimulus/Response)
- Teaching system: Teacher, computer, teaching machine, book, workbook
- He/She: We use "she" in the traditional way to cover "he" and "she" without prejudice against my own sex, in order to keep our prose simple. Luckily one can readily observe that the word "woman" contains the word "man", just as the pronoun "she" contains the pronoun "he".

SKILLS VS KNOWLEDGE

We are not usually playing these terms out against each other. When we say "knowledge", we often also mean skill, unless we clearly emphasise the difference. We do not always want to

express things in the most abstract (and sometimes least understandable" form such as "Subject matter") because readers will not always see the full implications of an umbrella term but respond to only one of its meanings.

TASK

The word "task" is a fairly good umbrella term because:

- Factual knowledge can be converted into question-answer form, and the task is then to answer the questions.
- Such Q-A tasks also convert knowledge into behaviour (Skinner's concern) and make it observable and countable.
- A task can also be of a practical nature, e.g. repair a TV set, i.e. a procedure.
- The word task (singular) can cover a single task (one-step task), e.g. "drop the ball", or a chain of tasks, e.g. long-division, solving a problem in trigonometry, cooking a dish, repairing a tractor.

Therefore we can say, the subject matter is a set of tasks, and the children's goal is to learn to carry out these tasks up to a certain standard **P**.

SPEED AND LATENCY

Note: We forgot to mention elsewhere that speed and latency are also part of the target specification. That's why Practice is an important component of METAL.

The meaning of speed is obvious.

Latency is the time a system needs before it responds (swings into action). In the case of the student, it is the time she spends mulling over the problem.

Practice is necessary to ensure that the student can perform her tasks with reasonable speed and not excessive latency. Times for this can be specified.

^==== 040-C-CONVERSATION ==== ENDS

^==== 050-P-PRACTICE ==== STARTS

PRACTICE IS ESSENTIAL

"Groundwork" leads to Understanding.
"Practice" converts Understanding into Skill,
i.e. handling information
with speed and ease.

Practice is an essential part on the route from initial instruction to mastery. Mastery is required at exams and at work.

Motto:

"Prepare and practise
like a trainee bomb disposal expert,
leave nothing to chance,
and any exam will be like
child's play
for you. You can do it!"



(img 1039 Bomb disposal)

To my students:
Be ambitious.
Only the best is good enough for you.

SCHOOLS KNOW NOTHING ABOUT PRACTICE

Traditionally, students in school never never never practise. Only piano students or sports fans (and such people) know about practice. Practice means repeating exactly the same task again and again until a person can carry out this task without hesitation, at ease and with perfection.

Having occasionally "another go" at a task is not practice.

The tasks students normally receive at school (e.g. as home work), allegedly for practice, are simply disguised tests (but tests with no consequences, i.e. useless as tests).

If done at home, the student somehow composes an answer (often with difficulty, or with the help of siblings or parents) and brings it back to school. In school, his answers are marked right or wrong, and that is that. The student has learnt nothing from this activity.

What should happen if a student gets an item wrong is this: She should be given a set of tasks which teaches her to get that task, and similar tasks, right. Then she should keep carrying out these tasks until she gets them right. This does not happen at school, and the homework was therefore a waste of time.

In METAL, practice is an essential (= indispensable) element of learning, and it is precisely defined.

SUBJECT-MATTER SUMMARY: KNOWLEDGE CONVERTED INTO TASKS

Basis of practice (and of all revisions) is the subject-matter summary. It contains, in concentrated form, all the tasks the student has to perform. They often come in a question-and-answer format, like in the example of the Creation Myth given in NAQ-14.

But they can also be procedures (sequences of tasks), as discussed above under Gilbert style of programming.

The student is presented with knowledge in the form of tasks, which can be counted so that success can be measured.

PRACTISE UNTIL 100% CORRECT

The student now has to practise answering the questions (or carrying out the tasks) until she has mastered them (100%). She is guided by a learning algorithm which gives the most efficient sequence for doing this. It is based on the curves of forgetting established by Ebbinghaus (1885).

The tasks are presented in groups of ten (10 questions with 10 answers, answer written immediately underneath each question). Each group of ten tasks is called an "Exercise".

DEFINITION OF "EXERCISE"

The subject matter which the student has studied with the programme in Phase 1 (Groundwork) and "played about with" with the teacher and her mates in Phase 2 (Conversation) has now been condensed into a number of "exercises", which she has to master.

PRACTICE WITH PENCIL AND PAPER OR WITH COMPUTER

The exercises can be done guided by the computer and/or with pencil and paper. The student is also encouraged to take the exercises home, not as a duty (i.e. not as hated homework), but as a chance so that she can show off with her successes tomorrow.

The exercises are the basis of the student's work during the Practice phase and during all Revision sessions.

The exercises can be printed on Quiz-Cards, on sheets of paper or in booklets or on flash-cards or presented by the computer.

The exercises are the basis for practice and revision.

PRACTICE IS INDIVIDUAL WORK: NO TEACHER REQUIRED

They can be used for individual work. The answers are printed immediately underneath the questions. The student covers the answer with a folded slip of paper, tries to answer the question and writes his answer on the answer-slip. Then she slides the slip down and reveals the correct answer. She marks it as right or wrong. She continues working through the items from 1 to 10 until she gets 10 answers right in succession. This proves that she remembers all items for at least the duration of the exercise.

FULL DETAILS ON THE INTERNET

Sophisticated techniques to make this format of learning even more efficient have been published on the Internet.

http://www.rtc-idyll.com/shell_dyll/contents/vocabulary_learning/vocabulary_and_revisions_basic.html

There is also an algorithm (explicit procedure) controlling the most effective sequence in which to tackle the 10 items of a standard exercise, with the goal of getting it 100% correct and retaining the skill till the next prescribed revision date (Bung, 1982). This algorithm is also based on the Ebbinghaus curves.

TREAT PRACTICE AS SPORT

Students must be shown that these activities are a kind of sport. There are right answers and wrong answers. By steady practice, everybody (even the allegedly slowest student) can get all answers right. It is the teacher's task to develop this attitude in his students. The learning algorithm shows the student (even the slow student!) how to do it.

Students can take the quiz-cards (exercises) home, not as homework, but as a chance to get even better in this sport and to show off tomorrow with their achievements.

A CHANCE FOR THE WEAKER STUDENTS

The weaker students can take the exercises home. They might not be able to "shine" tomorrow, but at least they can be as good as the others (luckily, nobody can be better than 100%, and 90% is near enough to 100%).

With current teaching methods the "weak" students do not have a chance of being as good as the others; but with this method they do. The programmed modules ensure that they understand everything, even if, perhaps, at a snail's pace. The quiz-cards ensure that they can respond quickly and confidently.

HELP EACH OTHER

Students can be encouraged to help each other by practising with the quiz-cards, perhaps on the bus on the way home. This is a sport, not a chore, and a useful sport at that.

TEACHERS MUST "PROMOTE" THE EXERCISES

It is up to the teacher to make suggestions which the students find attractive. The teacher can excel in doing this, whereas in teaching the initial information she will inevitably perform worse than the teaching programme.

Reason: The teaching programme can be tested and improved and retested, until it performs to the required target standard of 90%, whereas the teacher's performance is improvised and cannot be reliably improved.

SUMMARY OF PRACTICE PHASE

1. The student practises each exercise of 10 items until she has mastered it, i.e. she can answer 10 items correctly in succession. That is 100% mastery.
2. Achieving this mastery is easy because she has a learning algorithm which tells her exactly what to do at each step.
3. She expects to remember 90% when the next revision is due.
4. During the next revision she has to "pump up" her standard to bring it back from 90% to 100%.
5. Pumping up the standard from 90% to 100% will usually take only a few minutes per exercise.
6. Pumping up is fun because the student gets most of the answers right.
7. The student can go back to Conversation sessions with the teacher and her mates if she feels like it. Then she resumes Practice. Practice and Conversation aid each other.

PREVIEW OF REVISION PHASE**THERMOSTAT OF LEARNING**

8. This continues at increasing intervals throughout the year until the exams approach. The student maintains the retention level of 90% throughout the year, like a thermostat maintains the temperature in a house.
9. By contrast, cramming before the exam is diabolical because the student, when she starts, gets most her answers wrong and, immediately after the exam, she forgets most of what she has "learnt".

^==== 050-P-PRACTICE ==== ENDS

^==== 060-R-REVISION ==== STARTS

ENCOURAGEMENT

To my students:

Learning is pointless
if then you forget.

Successful learning
means
remembering what you have learnt.

If we want to remember, we have to **revise**,
not after we have forgotten but
before we forget.

FIRST GENERAL PRINCIPLES, THEN TECHNICAL DETAILS

We shall first discuss the general principles and then present the technical details.

CONTENTS OF REVISION

The **exercises** used during the revision phase are exactly the same that were used during practice (e.g. on paper [workbooks, worksheets] or as computer exercises).

REVISION = "PRACTICE" REPEATED WITH PRECISE METHODS AT PRESCRIBED TIMES

Revision is simply "Practice" continued for several months and carried out at precisely prescribed intervals. The same target applies (100%) and the same learning algorithm is used. The intervals are gradually stretched, from very short intervals to quite long intervals. This shows how the power of memory increases.

WHEN TO REVISE: GENERAL PRINCIPLE

Revisions are due whenever the student has forgotten no more than 10%. Time needed for revision is then tiny, and the student has the pleasure of noticing that she still remembers most of what she has been learning.

INTENSIVE CARE: GENERAL PRINCIPLE

For the odd item that slips through the net and proves more difficult to learn than the others, there is a procedure called "Intensive Care Exercise" (ICE) which gradually increases the frequency of revisions until this difficult item becomes as easy as all the others: If an item is revised often enough and at the right intervals, it cannot "resist", it will become easy. See below for full details of the procedure (which we have borrowed from a language website on the Internet).
http://www.rtc-idyll.com/shell_dyll/contents/vocabulary_learning/vocabulary_and_revisions_basic.html#revisions
(Downloaded 2020-01-14)

TIMING OF REVISIONS

The theory of revisions has been spelt out in layman's terms on the internet. The essence of this is the "Revision Calendar":

TIME TOLERANCE

If the student cannot do the exact times, she should stick to them as closely as she can to minimise the damage (damage = more forgetting than predicted by the system).

The revision times of the earlier revisions (R1, 2, 3) are much more time-sensitive than the revision times of the later revisions (R6, R7, R8).

In practice, if you delay R2 by one day, the loss of retention will be enormous (as the Ebbinghaus curve, below, indicates), whereas it will make hardly any difference if you delay R7 or R8 by a day or two.

REVISION MORE IMPORTANT THAN NEW LEARNING

If pressure of time means that we have to choose between new learning (learning new things) and revising (carrying out the revisions which are due on a given day), revision is always more important than new learning.

ANALOGY: CASH AND THE THIEVES

Analogy: If you have a bundle of cash in your house, and you know that the moment you leave the house, the burglars will come and steal it, will you go out to earn another bundle of money, or will you stay at home and protect the bag that you have already earned? Of course, you will stay at home and guard what you have already earned.

If you go out to earn more money, each bundle of it in turn will be stolen and you will never have more than the bundle just earned.

Therefore before you go out to earn more money, you must take measures to guard the bundle you already have (e.g. hire security guards, take the money to the bank, install an alarm system, etc.).

It is the same with learning. Before you learn new information, you must ensure that you do not forget what you have already learnt, i.e. you must do the prescribed revisions.

If you keep learning with almost instant forgetting, it is the same as trying to fill a leaking bucket with water, and the bucket will never get full. Therefore before you pump any more water, you have to mend the leaking bucket.



There's a hole in my bucket, dear Lisa

(img 1038 There's a hole in my bucket)

IN BRIEF

Revision is always more important than learning new things. All children should reach a 90% standard. This means that they can take a pride in their achievements. No child should be presumed to be incapable of this standard: That is the beauty of programmed instruction as part of METAL. Children will be programmed for success.

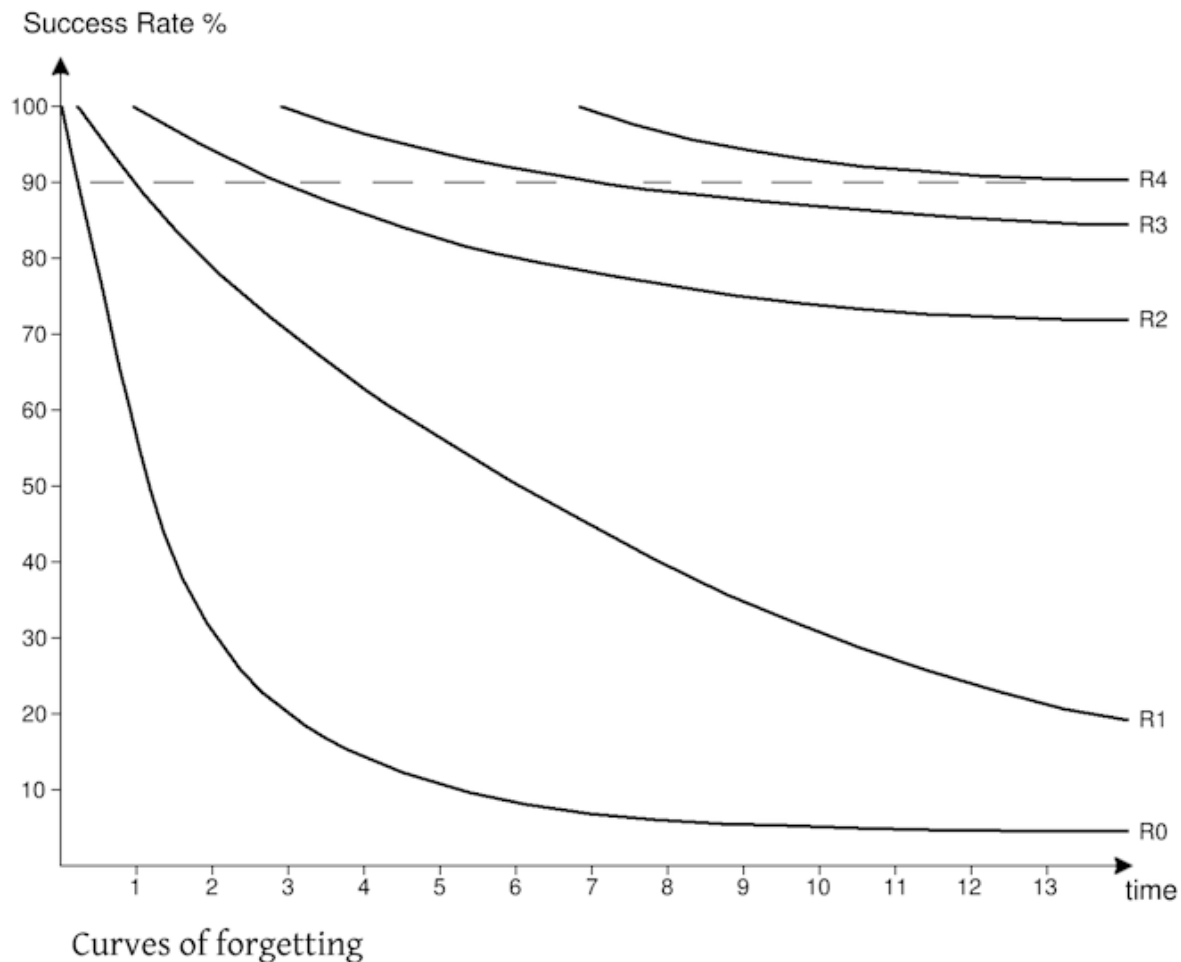
WHY CRAMMING IS SILLY

The current practice of cramming during the week or weeks before the exam is silly.

1. Time: Crammed revisions take much longer than the planned revisions prescribed by METAL, because the students start at a much lower retention level.
2. Experience: The experience is unpleasant because it demonstrates to the students how little they know, whereas planned revisions (METAL plan) demonstrate to them how much they know.
3. Usefulness: The procedure of cramming leads only to temporary knowledge: most of it will be forgotten immediately after the exam.

RESEARCH BASIS OF THE REVISION CALENDAR

The famous research of Ebbinghaus (1885 (sic!)) has given us a means of estimating the time when the student still remembers 90% of what she last learnt (or revised). The following diagram (idealised from Ebbinghaus) shows the speed of forgetting.



Curves of forgetting (after Ebbinghaus, 1885)

(img 1021 Ebbinghaus Curves_of_forgetting, 700)

"The curve of forgetting R0 (Revision 0 = Initial learning) is roughly based on Ebbinghaus's work: Most of what we have learnt on any one occasion will be forgotten within the first two days. So, on Day 3 or 4, the retention rate may be 10% or 20%. A revision starting from that basis is very time-consuming. ('Revising' means to 'bump' the success rate back up to 100%.) But if we start 'bumping' at 90%, the success rate of 100% will be restored very fast."

Source:

http://www.rtc-idyll.com/shell_dy11/contents/academic_publications/bung_1992_dynamic_learning_algos_prague/bung_1992_dynamic_learning_algorithms.html

CONTENTS OF REVISION

The original practice exercises (sets of tasks) will be used for the revisions. They cover everything the student has to know.

WHY STUDENTS WILL ENJOY REVISING ON TIME

The students will love to do the revisions, once they realise

- how much time they save by doing the revisions on time,
- how much praise they earn,
- how much progress towards their final goal they make,
- and how much fun it is to play this game in which they can be always right (provided they put in the necessary practice).

A computer programmer could be asked to create a computer program which calculates the revision times of each child and for each exercise to make the dates easier to remember. The website also describes a manual system (with a printed diary) by which students can control their own revision times.

REGULAR REVISION HOUR AT THE BEGINNING OF EVERY DAY

Some time could be set aside at the beginning of each school day for revisions (like time has been set aside for Assembly).

A CHALLENGE TO SCHOOLS

If a school says that they cannot accommodate properly timed revisions in their time table (in the traditional organisation), it shows that this school does not care about real learning and about real success of the children but only the fake success of passing exams and getting certificates.

SCHOOLS MAY HAVE TO RE-ORGANISE

The revision schedule shows
what children need to succeed.
The school has to adjust to their requirements
rather than the other way round.

NO NEED FOR CRAMMING

If the above revision schedule is implemented, there is no need for cramming immediately before the exam. The students can walk with confidence into any exam at any time.

STEPS TO EXAM SUCCESS

1. Learning the basics through programmed lessons (Groundwork)
2. Becoming flexible in the company of teachers and peers (Conversation)
3. Practice with the help of Q-A Exercises (Practice)
4. Revisions as recommended by the Revision Diary (Revisions)
5. No cramming before the exam. All knowledge will be alive and well in the student's head.
6. Exams
7. Celebrations, and thank you to the teachers (and the programme writers)

What all this goes to prove, if nothing else, is that it is **possible** for most students to learn successfully if they are taught with the appropriate methods. I had to demonstrate this to my future critics.

ARE THE ROMA STUDENTS *CONDEMNED*** TO FAIL?**

If the appropriate methods are not used and the Roma students therefore do not learn, it is up to those who decide which methods are or are not used, which media (teaching systems and teaching algorithms etc.) are employed or not employed to justify their decision; e.g. that it is too expensive, or takes too much labour, or that the Roma students (or the other slow-learning students) do not deserve it etc. These arguments can then be investigated by others to see if they are reasonable, or fair, or genuine, etc.

THE ULTIMATE TEST OF SUCCESS

The ultimate test is always: retention of item over 4 months (without artificial revision). Any item which fails this test is

fed back into intensive care and will be revised 8 more times over the course of 8 months: 8 revisions in 8 months is not too great a burden.

BAD ADVICE POPULAR IN SCHOOLS

Schools traditionally advise their students: "Revise as often as possible". This is bad advice because it means that there will be no revision at all, since it is never "possible" (i.e. convenient). Revision (i.e. cramming) immediately before the exam is a form of cheating since it is designed to convince the examiners that the student has skills which she doesn't have, i.e. didn't have before cramming and will not have after the exam.

SOURCE OF OUR REVISION SCHEDULE

We have borrowed our revision schedule (based on the Ebbinghaus curves) from a language learning website ("Dynamic Language Learning") and associated publications, and slightly adapted it to suit our present purposes.

It works on the principle: "Revise as little as possible, but as often as necessary". There is an algorithm which determines what and when revisions are necessary and can do this for each item (task) and each student. Different students find different items easy or difficult to learn and to remember. The retention algorithm takes account of that.

Source:

http://www.rtc-idyll.com/shell_dy11/contents/academic_publications/bung_1992_dynamic_learning_algos_prague/bung_1992_dynamic_learning_algorithms.html

The tasks are organised into the same exercises (groups of 10 items or 10 tasks, simple or complex) as those used during the practice sessions, which are in fact the start of the revision chains.

THE THREE COMPONENTS OF THE REVISION SCHEDULE

The revision schedule has three components:

- Main revisions (default): 8 revisions distributed over 8 months.
- Head-start (voluntary revisions, to make things easier at the beginning)
- Intensive Care Exercises (ICE): which bring a few particularly difficult tasks ("trouble makers") to heel

MAIN REVISIONS

It will be helpful to view the main revisions on a time line ("revision scale"). They are located close together at the beginning and are gradually spaced out by (approximately) doubling the intervals from one revision to the next, until, after a 4-month interval, a 4 month retention has been proved. On the following graph, each number represents a revision. 0 (zero) represents "Revision 0", i.e. initial learning. The revisions on the line are spaced out approximately, but **NOT EXACTLY TO SCALE**.

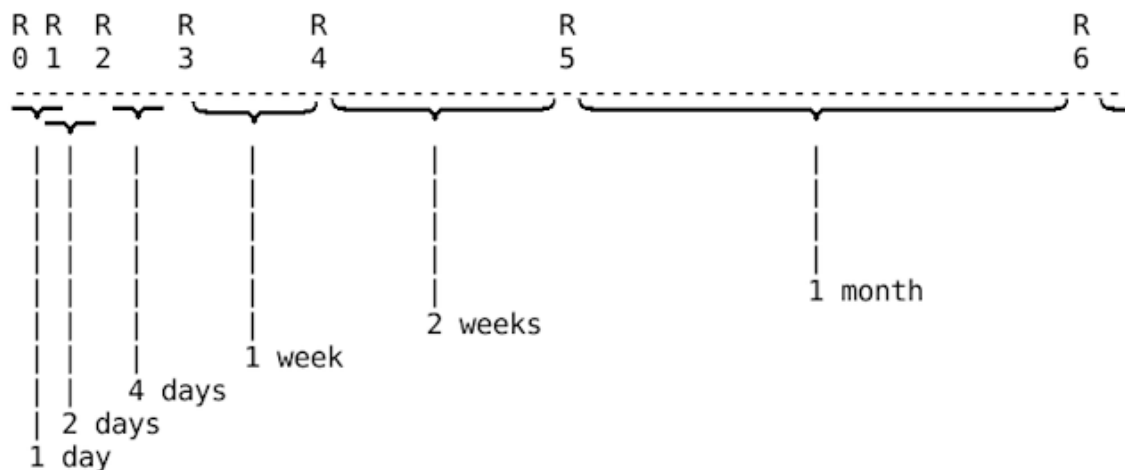


Default revision schedule: 8 revisions distributed over 8 months

(img 0022 Default revision schedule, 700)

This gives you an impression of the scale of revisions as a whole. To make the details more readable, we will now present it in two parts:

- Part 1: from R0 to R6 (after 1 month retention)
- Part 2: from R6 to R8 (aiming at long term retention)



Default revision schedule: Left half

(img 0023 Default revision schedule, left half, 700)



Default revision schedule: Right half

(img 0024 Default revision schedule, right half, 700)

HEAD-START

As the Ebbinghaus curves show, forgetting is most rapid immediately after initial learning. Within a few hours much that has been learnt will be forgotten. We can combat this initial forgetting by doing the Head-start revisions. We have described them as voluntary in order not to make the whole system too burdensome, but any student who wants to make the later revisions easy, and any teacher who wants his students to succeed, should encourage and facilitate them "as much as possible (LOL)".

The teacher has to supply the students with Workbooks, revision sheets, quiz cards, and the like, on which they can test themselves and can practise.

Ambitious students will be keen to do the Head-start revisions voluntarily.

Slow learners will be keen to do them if the teacher convinces them how effective these early revisions are. After a few successes, the slow students will catch on to the idea and be keen to do these revisions voluntarily: nobody wants to be considered "slow" or "stupid", and these extra early revisions are a sure way of bringing the slow students in line with the other students. (Note that our basic assumption is that the Roma students who are bad attenders, misbehaved, or show no interest, do behave like this because the lessons they are forced to attend teach them nothing. With METAL we have shown how this can be remedied. If teaching is appropriate for the students, most of them will be keen to learn and to co-operate. Laziness and bad behaviour is **not** innate to them.)

The ideal times for the Head-start Revisions are as follows:

- 1 hour after initial learning
- Before going to sleep on the same date
- First thing in the morning of the next day

REVISION AFTER 1 HOUR IS THE MOST IMPORTANT ONE

If the teacher cannot organise a revision exactly 1 hour after initial learning, she should do it as closely as possible to the suggested time. E.g. at the end of the current lesson, e.g. 40 minutes after initial learning, **AND**, if possible at the beginning of the next lesson, **AND**, if possible, at the end of the school day.

ARE THESE PRESCRIPTIONS EXAGGERATED?

All this may seem rather exaggerated. But the simple question is: Do we want our students to learn (i.e. to remember)? Then as teachers, or school organisers, are we willing to arrange things in such a way that the students can do what is psychologically necessary for successful learning? Or do we allow them to fail, simply because we are not prepared to make the necessary arrangements, arrangements of which we **KNOW** that they will lead to learning and to retention?

INTENSIVE CARE EXERCISES (ICE)

DIFFICULTY OF ITEMS VARIES FROM STUDENT TO STUDENT

The revisions, at ever growing intervals, are memory tests for our students. Some items (tasks) are easy, some are difficult. What is easy for one student, may be difficult for another, and vice versa, i.e. degree of difficulty of an item is subjective (depends on the student). The difficult items are more difficult to "remember" than the easy ones. When I say "remember" in

respect of tasks which are procedures (skills), I mean "ability to carry out the procedure".

The main revision schedule (default revisions) works for most items and for most students. "Works" means that the retention rate is 90%. In an exercise of ten items no more than one mistake will be made.

The revisions as from R4 (after one week's retention) serve a dual purpose:

1. to gradually extend the retention period for all items (i.e. prevent forgetting)
2. to identify ("hunt for") difficult items and difficult exercises.

DEFINITION OF DIFFICULT ITEMS AND DIFFICULT EXERCISES

- Any task the student gets wrong during R4 is labelled a "difficult item" (for this student).
- Any exercise which, during R4, contains three or more difficult items is labelled a "difficult exercise".
- Difficult items are taken into "special measures", called "Intensive Care Exercises" (ICE).

LENGTHENING VS SHORTENING THE REVISION INTERVALS

As we have seen, the intervals between the default revisions become **longer**. This is exactly what ordinary items require.

However, **difficult items** require that the intervals are shortened. That is achieved by ICE. ICE **shortens** the intervals between revisions, whereas the default schedule **lengthens** them.

How is this done?

THE REVISION TRACKS

Imagine the revision schedule as a piece of railway track, where the train stops at specified intervals of so and so many days for a revision session.

Here is such a track (not to scale, to fit it on the paper).

R1--R2--R3----R4-----R5-----R6-----R7-----R8

(img 0026 Basic revision track, not to scale, 700)

Let this be the default revisions.

When an item or an exercise goes into intensive care, an additional track is prescribed for it (i.e. an additional 8 revisions (that's not unbearably many) of 8 months. The extra track starts at the point where the problem was identified. E.g. at R4 of the previous track.

The two or three tracks together then look like this:

The two or three tracks together then look like this:

R1 R2 R3			R1 R2 R3			R4		R5		R1 R2 R3		R4		R5		R6		R7	
R4			R4			R5		R6		R7		R8 (default)		R8 (extra track)					
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

The combined revision tracks

(img 0025 Combined revision tracks, 608)

The effect of the extra tracks (additional chains of revisions) i.e. carrying out the revisions on all the tracks when they are due (or more or less when they are due; there is some tolerance now in these additional timings), is as follows:

1. When the student gives a correct answer, the interval to the next revision is increased (i.e. there will be fewer revisions). That is implicit in the default revisions.
2. When the student gives a wrong answer, the algorithm prescribes additional revisions, i.e. the intervals are decreased. This can be seen in the above sample tracks where we have displayed all the revisions together in the bottom track and marked them by x-es. Note that each of these revisions only requires some minutes; they suffice to bring the performance level back to 100%.
3. **ONLY AS MANY REVISIONS AS NECESSARY**
This satisfies the principle "As few revisions as possible, but as many as necessary"!!! So the intervals between revisions dynamically increase or decrease, as determined by the performance of the student. This is very important to me, in case we are accused of heaping unnecessary revisions on my poor students. We want them to succeed, that's all.
4. The additional tracks will be added as often as necessary. The task will become increasingly easy for the student, as the intervals are decreased and the number of revisions is increased, and her retention will become better and better.

WINNING THE BATTLE AGAINST THE DIFFICULT ITEMS: A SPORT

You may call this "putting the thumb screws" on the difficult item, gently but inexorably. It should also be put to the student as a **sport**, hunting for difficult items:

"Do not be dismayed by mistakes, but regard them as a challenge; treat this item like an enemy in gang warfare, and try to "destroy" it by learning it (learning its secrets). Identify the enemy: who is stronger, you or the difficult item? Will you wear out the difficult item, which you can do just by doing the revisions at the prescribed time? The revision track is your secret weapon; nothing can resist that; you could even learn to spell "hydroxychloroquine", bet if you can't. If you are determined, the teacher is here to help you in this battle." (hydro-xy-chloro-quine, that's a good start; divide and rule).

"We shall go on to the end. We shall fight in France, we shall fight on the seas and oceans, we shall fight with growing confidence and growing strength in the air, we shall defend our island, whatever the cost may be. We shall fight on the beaches, we shall fight on the landing grounds, we shall fight in the fields and in the streets, we shall fight in the hills; **we shall never surrender**." (Churchill)

Roma students shall never surrender.

NATURAL SELECTION SETS IN

We have to encourage this attitude in the students. ICE is their secret weapon. Eventually they will succeed with the 4-month retention test. That is the end of the "**planned revisions**".

It can now be assumed that the skills so well learned will remain "alive" for another 4 months.

After that **natural selection** takes over.

The theory says: If the item is useful, it will be needed at least three times a year "in normal life", i.e. in other contexts. On average it will be needed once every four months, it will have a "**natural revision**" every four months, and therefore it will not be forgotten.

If no natural revisions occur within the next four months, the item is deemed to be "useless" (for the time being, or for life), can safely be forgotten, and be quickly re-learnt once it is needed in real life.

AD-HOC REVISIONS IF REQUIRED

If this assumption does not fit into the pattern of school life, e.g. if an item is declared "useless" by the above rule, but is needed for the next exam, then the teacher has to arrange additional revisions at suitable intervals, say once a month to

be absolutely safe, to ensure the student can perform well during the exam.

And now the student can with confidence look forward to the exam and the reward for all her efforts.

^==== 060-R-REVISION ==== ENDS

^==== THE COMPONENTS OF METAL ==== ENDS

^==== 070-EXAMPLES FROM PROGRAMMED BOOKS ==== STARTS**CONTENTS OF THIS SECTION:**

^Principles of good teaching: Skinner style
^Teach your baby to write, or: Keep it simple, stupid
^Principles of good teaching: Gilbert style
^Principles of good teaching: Crowder style

SOME SAMPLE PROGRAMMES: SKINNER, CROWDER AND GILBERT

The traditions of programmed instruction, once so popular, have faded so much into the haze of ancient history that we have to give our readers at least a few instant examples. Many more, however, can be found in the libraries and in the publishers' archives, and we commend them to our readers. It would be even better, if our readers derived inspiration from these ideas and developed new programmes with the technical means now available, computers and the internet. Huge quantities, for every conceivable subject, and any conceivable type of student, could be developed, placed on-line, and made freely available (open source licence, like Linux, Wikipedia, etc) and be improved by anyone who feels like it. The best programme on any one topic would eventually win.

**EVEN THE MOST OBSCURE BUT DESIRABLE TOPICS
WOULD BECOME ECONOMICALLY FEASIBLE**

Even a topic as specialised and perhaps uncommon as "English vocabulary and spelling for native speakers of Slovak (with special attention to topics which appeal to Roma children" would become feasible and worthwhile. Worldwide there would be enough schools with enough Roma children to benefit from it.

^==== PRINCIPLES OF GOOD TEACHING: SKINNER STYLE ==== STARTS**A LINEAR PROGRAMME IN BOOK FORM:
SKINNER STYLE**

We shall now present a page from a linear teaching programme in book form. This programme could also be presented on a computer. It is taken from Scales 1970: "An introduction to vectors and matrices" (32 pp). The topic is "Vector columns and vector displacements".

The steps are small. Each step contains a question. The correct answer is printed immediately underneath the question. The student is expected to cover the correct answer with a folded piece of paper and write her answer on the paper. Then she pulls the paper down, sees the model answer and knows immediately whether her answer was right or wrong.

If she was right, she has immediate satisfaction and is encouraged to move on to the next step. If she was wrong, she still remembers what thinking (including careless reading of the question) led to the mistake and will be better prepared for the next step.

This feature is called "immediate knowledge of results" or "immediate feedback".

This feature is missing in most self-instructional textbooks and in many Internet lessons. These courses are interspersed with so-called exercises, which are in fact not exercises but tests. Usually they provide a number of tasks (problems), say between five and ten of them, and the answers can be found at the end of the chapter or of the book.

This arrangement is frustrating and counter-productive. The student has two options:

1. She solves all the problems first and writes down the answers. Then she turns to the model answers and marks her own work. If all her answers are correct, this is fine. But if she has made mistakes, then the chances are that, by the time she has fiddled with the book and found the model answers, she will have forgotten the train of thought that led to the mistake and she will therefore not benefit from the model answer. So here Skinner's principle of immediate reinforcement is advantageous.
2. Or the student looks up the correct answer after each problem. This involves even more fiddling with the pages, and distracts the student from learning.

Section 1

Vector Columns and Vector Displacements

- Q1** Captain Skullduggery was studying a chart showing where hidden treasure was buried. Underneath the map was written:

$$\begin{pmatrix} 5 \\ 3 \end{pmatrix} + \begin{pmatrix} 6 \\ 2 \end{pmatrix} = \begin{pmatrix} 11 \\ 5 \end{pmatrix} \qquad \begin{pmatrix} 2 \\ 7 \end{pmatrix} + \begin{pmatrix} 4 \\ 3 \end{pmatrix} = \begin{pmatrix} - \\ - \end{pmatrix}$$

The numbers in the second bracket were rubbed out.
What do you think they were?

- A1** $\begin{pmatrix} 6 \\ 10 \end{pmatrix}$ Add 2 and 4 together to get 6. Add 7 and 3 together to get 10.

- Q2** Complete the following: $\begin{pmatrix} 3 \\ 4 \end{pmatrix} + \begin{pmatrix} 4 \\ 5 \end{pmatrix} = \begin{pmatrix} - \\ - \end{pmatrix}$

- A2** $\begin{pmatrix} 7 \\ 9 \end{pmatrix}$.

- Q3** By the side of the map the Captain could see:

$$\begin{pmatrix} 5 \\ 1 \end{pmatrix} + \begin{pmatrix} 2 \\ 11 \end{pmatrix} + \begin{pmatrix} 3 \\ 8 \end{pmatrix} = \begin{pmatrix} 10 \\ 20 \end{pmatrix}$$

Complete the following: $\begin{pmatrix} 1 \\ 0 \end{pmatrix} + \begin{pmatrix} 19 \\ 4 \end{pmatrix} + \begin{pmatrix} 3 \\ 8 \end{pmatrix} = \begin{pmatrix} - \\ - \end{pmatrix}$

- A3** $\begin{pmatrix} 23 \\ 12 \end{pmatrix}$.

- Q4** The Captain already knew that in the code the top figure represented the number of steps East and the bottom figure the number of steps North.

So that $\begin{pmatrix} 5 \\ 3 \end{pmatrix}$ meant 5 steps East and 3 steps North and $\begin{pmatrix} 6 \\ 2 \end{pmatrix}$ represented _____ steps _____ and _____ steps _____.

- A4** 6 steps East and 2 steps North.

^==== PRINCIPLES OF GOOD TEACHING: SKINNER STYLE ==== ENDS

^==== PRINCIPLES OF GOOD TEACHING: GILBERT STYLE ==== STARTS

ELUSIVE BUT USEFUL

Thomas F Gilbert and his style of programming are elusive but should not be neglected. What we have found out about him makes it obvious that his approach can be used in schools and may be essential in situations (depending on topic, or student) where Skinner and Crowder "fail". It neatly rounds off our model of teaching and learning (METAL).

BACKGROUND INFORMATION

For background information see:

- Wikipedia on Thomas F Gilbert, where he is described as follows: "Thomas F. Gilbert (1927-1995) was a psychologist who is often known as the founder of the field of performance technology, also known as Human Performance Technology. Gilbert himself coined and used the term Performance Engineering. Gilbert applied his understanding of behavioral psychology to improve human performance at work and at school." [https://en.wikipedia.org/wiki/Thomas_Gilbert_\(engineer\)](https://en.wikipedia.org/wiki/Thomas_Gilbert_(engineer)) When Gilbert says "engineering" he emphasises efficiency, the determination of engineers to achieve predictable results.
- Anupam, Kumari (2014): "Development and validation of mathetics style programme in mathematics for grade IX students". (An application in a secondary school)
- Harless, J H, McGaulley M T and Cassels, S T 1966: "Mathetics. A system of programmed instruction". (An application for rehabilitating ex-prisoners. High failure rates, like in schools, are not acceptable in such a set-up.)

GILBERT APPROACH USED IN IN-HOUSE TRAINING

Personal communication: I understand from professionals who were active when Gilbert came on the scene and when Skinner was all the rage, that Gilbert's approach was received with great excitement, and was considered, so to speak, the icing on the cake of Skinner.

Those were the days when professionals from schools, the military, from industry and commerce came together in the Association for Programmed Learning (later called "Association for Programmed Learning and Educational Technology"; publishers of the journal "Programmed Learning And Educational Technology") to discuss the latest developments and how to apply them in their organisations. It started with B F Skinner, then came algorithms (or quasi-algorithms) spearheaded by L N Landa.

OBSESSED WITH RESULTS

When Gilbert's book "Mathetics" (sic!) arrived on the scene, excitement was great. This seemed to be the Holy Grail, efficient instruction, prepared with perfection, free of the constraints of Skinner and totally **results**-oriented. "Does it work? Does every detail work?" was all that mattered.

MILITARY AND BIG INDUSTRY CANNOT AFFORD FAILURE

If the military and big industry are getting enthusiastic, it is worth listening because they cannot afford failure, unlike schools, which need not care about failure because they can blame their students. (My objective is also to find out **why** Roma students are failing and to see what can be done to **prevent** it.)

Therefore in spite of the scant published evidence, I decided to bring Gilbert into my model. Let those who will use my model breathe new life into Gilbert.

THE WORD "MATHETICS"

Gilbert first published his technique in a new journal of which only two issues ever appeared:

Gilbert, Thomas F (1962): "Mathetics: an explicit theory for the design of teaching programmes." In: The Journal of Mathetics. (2 issues only). **Reprinted** in: Supplement 1 to REVIEW OF EDUCATIONAL CYBERNETICS AND APPLIED LINGUISTICS, London 1969 (RECALL reprint available in stack of Institute of Education library, UCL)

The word "mathetics" requires an explanation. It comes from Ancient Greek μαθητικός (mathētikós, "easily taught") (Wictionary). It has been misprinted and mistyped innumerable times. It is very difficult to get past the spellchecker with this word, or to google it. We will therefore in future refer to these programmes as **Gilbert programmes**.

UNABLE TO ACCESS ORIGINAL ARTICLES

Because of current circumstances, we have been unable to get hold of Gilbert's original articles at the Institute of Education and therefore rely for our description on Harless et al (1966), which can also be downloaded.

THREE ATTRACTIVE FEATURES OF GILBERT

There are three aspects of the Gilbert approach which we find particularly attractive:

1. Gilbert focusses on **results** rather than philosophy/ideology.
2. His determination to discover **exactly** what it is that prevents a student from carrying out a task correctly.

Gilbert calls this the "**knowledge gap**". That means he does not permit his programmers to simply write down whatever is the traditional way of teaching a topic or procedure, but demands that it is analysed from scratch and that all alternatives, however far-fetched, are considered. There are cases when it is found, that the traditional way is decidedly inefficient (that it does not stand up to fresh scrutiny).

3. The principle of **back-chaining**, which we shall now explain.

BACK-CHAINING

Many procedures (chains of tasks) are too long to be taught in one step.

Such chain operations may occur in long division and other mathematical operations, in cookery, in chemistry, in building or maintaining some mechanical device, and in many practical tasks.

Let us presume that the following tasks have to be learnt as a chain: Q, R, S, T, ..., X, Y, Z. Z completes the job and gives the student the satisfaction which God had on the sixth day: "And he saw that it was good". (Genesis 1:31) Gilbert gives his students this satisfaction repeatedly, starting on the **first** day.

It is **customary** in training, to let the student first practice Q, then QR, then QRS, and eventually QRS...Z. At each "step" he has to stop while the job is still incomplete and without any satisfaction of seeing usable results of her work. This is an example of the customary **forward**-chaining. It is not very motivating.

Gilbert recommends the opposite approach. He gives the student the incomplete job and lets her **complete** it (and admire the result); thus:

- First attempt: Student receives PQR...XY and adds Z. Applause.
- Next attempt: Student receives PQR...X and adds YZ. Applause. etc.
- This is back-chaining.
- Eventually the student has mastered the complete chain.

I see my Roma children responding well to that.

TOPICS FOR WHICH THE GILBERT APPROACH CAN BE USED

The Gilbert approach seems particularly useful for technical or visual and "tangible" topics, i.e. topics which are not mainly "verbal".

- By verbal topics I mean: history, philosophy, languages, literature, religious instruction.
- By visual or technical or tangible topics I mean: geometry, trigonometry, physics, biology, repair jobs, technical

skills, electrical engineering and any kind of skills training (where a chain of operations has to be learnt), etc.

I could imagine that some of these topics might appeal to my Roma students. If so, the Gilbert approach could be tried with them.

THE ELUSIVE GILBERT NOT SO ELUSIVE

At the last minute, on 13 April 2020, we came across Chyung 2008 (which we have not yet had time to read) but in which the name of Thomas F Gilbert occurs 81 times. Kurt Lewin occurs 23 times, and B F Skinner 22 times. Bronfenbrenner is not mentioned. Chyung writes:

Thomas Gilbert (1927-1995): Thomas Gilbert, known as the **father of human performance technology**, was a behaviorist who once worked in Skinner's laboratories. He taught at several universities and essentially created the job category of professional performance engineer. Gilbert published "Human Competence: Engineering Worthy Performance" in 1978, in which he described his **leisurely theorems** (including the behavior engineering model). Gilbert's work was influenced by Frederick Taylor, **Kurt Lewin**, and **B. F. Skinner**. He helped found the National Society for Programmed Instruction in the early 1960s, now known as the International Society for Performance Improvement (Dean, 1997; Gilbert, 1996). (Chyung, 2008, p 106) (my emphases)

A note on the word "leisurely":

Gilbert (1996) explained the meaning behind the term leisurely theorems by saying that the word leisure is rooted in an old French word that means "permission," which in turn implies an "opportunity" for doing something different and better, and the "time" available for doing so:

--- inner quote starts ---

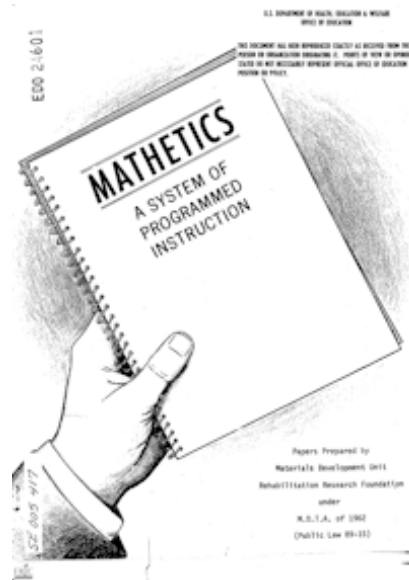
When we are permitted a break from arduous labor, we have the opportunity to accomplish other things. The Oxford English Dictionary calls it "an opportunity afforded by freedom from occupations," and "time allowed before it is too late." ... If (old-style) leisure is the product of time and opportunity, it is, indeed, the worthy aim of a system of performance engineering, and the one I consider to be its true purpose. (p. 11) (Gilbert, 1996)

--- inner quote ends ---

Gilbert (1996) used the word leisurely as a synonym for human capital, the product of time and opportunity, in describing his principles of engineering human performance and improving human competence. He called those principles "leisurely theorems." (Chyung, 2008)

We note that Lewin is noted also as an influence on Thomas F Gilbert (as he was mentioned elsewhere as a precursor of Bertalanffy). All the people whose ideas have influenced us turn out to be somehow connected.

MANY VARIANTS OF PROGRAMMED INSTRUCTION

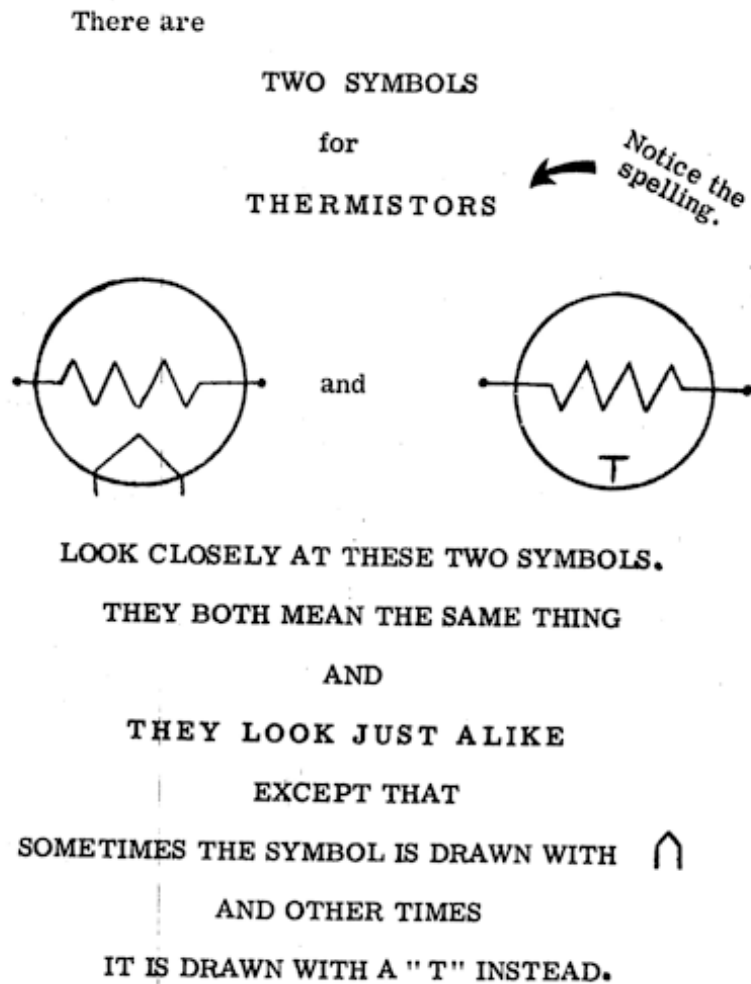


(img 1035 Mathetics, title, 200)

We hope it has by now become obvious that there are many variants of programmed instruction, and there is a suitable technique for any topic under the sun, and if there isn't, it can, or should, be developed.

McGaulley et al 1966 give a good idea of how these programmes are prepared and I need not repeat these prescriptions here.
<https://files.eric.ed.gov/fulltext/ED024601.pdf>

We are now going to show two charts taken from Gilbert style programmes in McGaulley et al 1966. They are quite different from what one sees in Skinner style programmes. They have been prepared and tested with extreme care, as close study will reveal. They contain the essential information the student has to master during the lesson and the programme makes sure, step by step, that the student does so. The teaching steps that go along with these diagrams might well look similar to a Skinner-type program (linear programme).



(img 1037 Gilbert Mathetics Electrical Circuits, 400)

Note the great care that is taken to make the student aware of the small difference between two symbols. Would a live teacher always take so much care?

CHARACTERISTICS OF AMEBAE

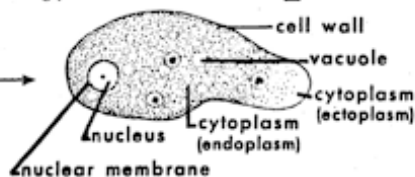
The CELL is the basic unit of life; each cell contains all of the characteristics necessary to sustain it. These may be classified according to STRUCTURE and FUNCTION.

Study carefully the characteristics, drawings, and labels shown below but do not try to memorize:

STRUCTURE characteristics

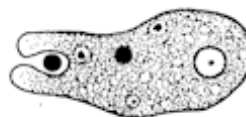
Locate the

1. nucleus
2. nuclear membrane
3. cell wall
4. vacuole
5. cytoplasm
 - a. endoplasm
 - b. ectoplasm

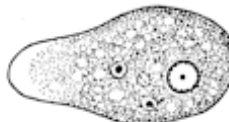


FUNCTION characteristics

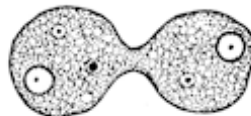
1. FEEDING: note how the pseudopodia engulf the food
2. MOVEMENT: note how the cell is pulled forward by the extended pseudopodia
3. REPRODUCTION: note how the cell multiplies by binary fission



FEEDING



MOVEMENT



REPRODUCTION

Remember:

all cells may be characterized by:

STRUCTURE & FUNCTION

If you already knew the information contained on this page, you may skip to page 7—otherwise continue your study of the above material on the next page.

(Adapted from "Amoebiasis: Laboratory Diagnosis, Part I,"
U.S. Department of Health, Education, and Welfare/Public
Health Service, Communicable Disease Center, Atlanta,
Georgia.)

(img 1036 Gilbert Mathetics Amebae, 400)

These charts are characteristic of many Gilbert programmes.

PROGRAMME AUTHORS HAVE TO BE HIGHLY SKILLED

There are two reasons why programmed lessons are more effective than live teachers:

1. They are tested and and improved until they produce guaranteed results.
2. Their authors are specialised and highly skilled.

One cannot just ask a teacher simply to "knock a programme together" as best he can and then expect it to work. That often happened with Skinner-type programmes and sometimes gave these programmes a bad reputation (Casas, 2002).

"The cost of training a staff of mathetical programmers is high, for it takes usually from six to eight months for a novice to become competent. During this time, little, if any, of the work he turns out is usable. Moreover, the attrition rate among matheticist trainees is high. For some, the mathetical procedure remains forever a mystery. Others cannot develop the knack of expressing their knowledge in terms that can be understood by the student." (from: McGaulley, Michael T 1966: "Mathetics in industrial and vocational training".)

GILBERT PROGRAMME IN HIGH SCHOOL MATHS

We have the results of a Gilbert style programme used in a high school in India. The author concluded her report:

"Programmed learning is a method which promotes the optimum development of the potentialities of the individuals. It is very useful for students as well as for teachers. Teachers can also prepare programmes on different topics of Mathematics, different subjects and in different languages, so that instruction can be imparted to the students in the best way. It is also useful for the students because it helps all types of students to learn at their own pace. This type of programme is also useful for correspondence and private students, who don't have direct contact with teachers. Moreover this programme saves time and energy as the students are able to learn through it in a short time. This study is very useful in the field of teaching Mathematics. Programmed learning as a self instructional technique needs to be tried out in India." (from: Anupam, Kumari (2014): "Development and validation of mathetics style programme in mathematics for grade IX students". In: International Journal on New Trends in Education and Their implications, Vol 5, 2014
Downloaded from:
<https://www.researchgate.net/publication/290429266>

^==== PRINCIPLES OF GOOD TEACHING: GILBERT STYLE ==== ENDS

^==== PRINCIPLES OF GOOD TEACHING: CROWDER STYLE ==== STARTS

EXAMPLES OF BRANCHING PROGRAMMES

We have listed the distinguishing marks of branching programmes above, when contrasting them with the other styles.

LARGER TEACHING STEPS & MISTAKES ANTICIPATED

The most obvious feature is that they have larger teaching steps (as much as one page at a time) and that they permit mistakes. The programme writer anticipates probable mistakes and writes remedial explanations to eliminate misunderstandings. There is one straight route through the programme for the student who only gives correct answers at the end of every step.

The student who makes one of anticipated mistakes is led into a remedial branch of the programme; hence the name "branching programme".

These programmes used to be presented on special teaching machines containing a moving film strip. When the student pressed a button corresponding to her choice in the multiple choice question, the film strip would move to the appropriate next step.



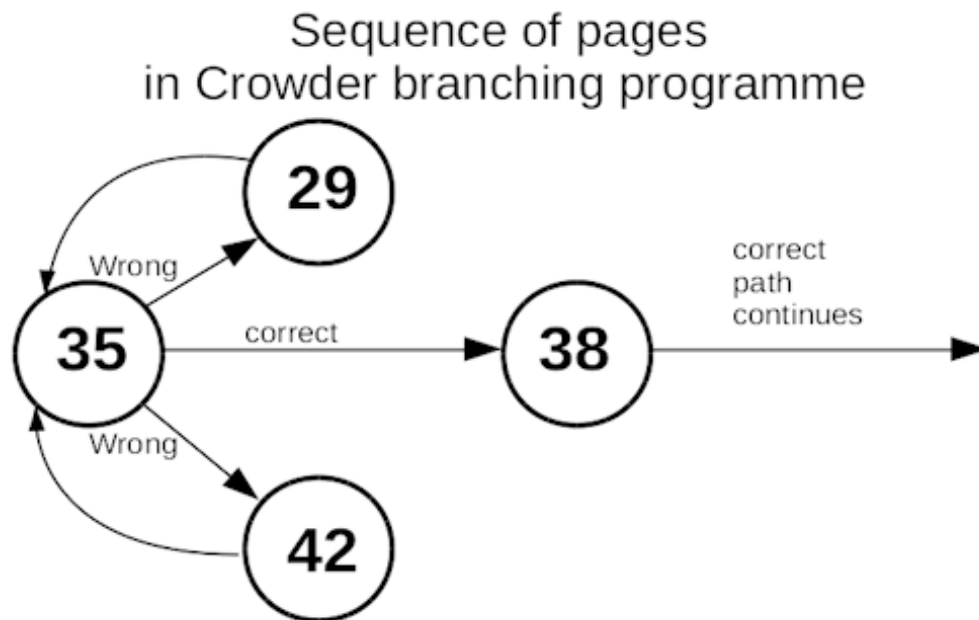
(img 1013 Teaching machine for branching programmes (Crowder), 237x194)

Later the same content was also made available in book form. The following examples are taken from such a book. (Crowder and Martin 1962).

On p 35, the student receives new information. This is a one-page teaching step. Then her understanding is tested by means of a multiple-choice question.

If she answers correctly, she is sent to p 38, where her answer is confirmed as correct, and the lesson continues with more information.

If she answers wrongly, she is sent to p 29 or p 42, where her error is explained. Then she is sent back to p 35, where she can try again to give the correct answer.



(img 1019 Crowder page sequence, 500)

THREE PAGES FROM A BRANCHING PROGRAMME.

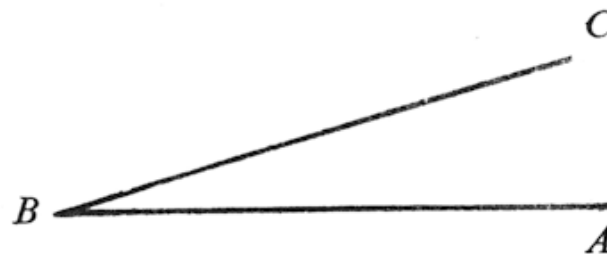
35

CHAPTER 2

The Importance of the Right-angled Triangle

We are about to see how the ideas of ratio and proportion apply to the triangle.

You should know that an *angle* is a geometric figure formed by two line segments drawn from the same point, or vertex. Thus



An angle usually is designated by capital letters placed at the vertex and the sides of the angle, as shown above. In this case, we might speak of the diagram as showing angle *ABC* (with the vertex letter in the middle), or as $\angle ABC$, or just as $\angle B$.

Angles, as you know, are measured in *degrees*. A circle contains 360 degrees (360°).

You should remember the answer to this question:
How many degrees are there in a right angle?

45°. **page 29**

90°. **page 38**

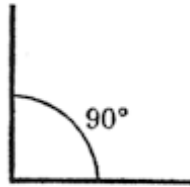
100°. **page 42**

38

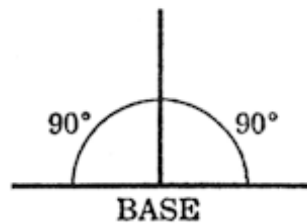
[from page 35]

YOUR ANSWER: 90° .

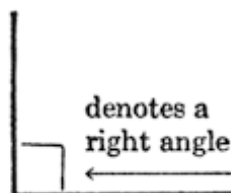
You are correct. The unit of angle measurement is so chosen that a right angle contains 90° .



One side of a right angle is said to be *perpendicular* to the other side. A perpendicular line is at right angles (plural) to a base or foot, because the adjacent angles will both be 90° .



In this book, when we wish to call particular attention to the fact that a particular angle is a right angle, we shall mark it with a small square as shown below.



Now we know what an angle is. A triangle (*tri* = three + *angle*) is a closed geometric figure constructed with just three lines and containing three angles.

What do you suppose we mean by a right triangle?

A triangle, one of the angles of which is a right angle. **page 41**

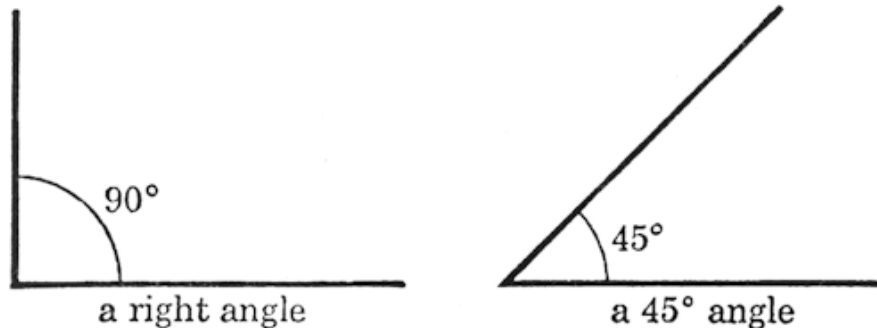
A triangle, all the angles of which are right angles. **page 45**

29*[from page 35]*

YOUR ANSWER: There are 45° in a right angle.

No.

A right angle is sometimes called a square angle. The floor of a room makes a right angle with the wall, etc. When something stands “straight up”, it makes a right angle with the level ground.



The unit of angle measurement, the degree ($^\circ$), is so chosen that there are 90° in a right angle. (This unit of angle measure started with the ancient Babylonians.) Your answer, 45° , would be half of a right angle.

Now return to page 35 and choose the right answer.

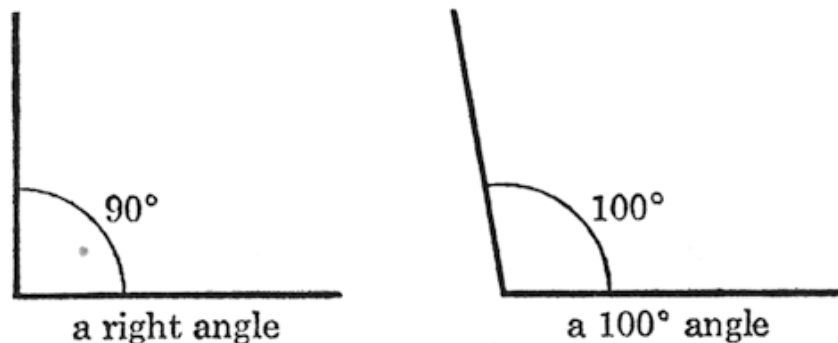
(img 1017 Crowder, Trig, p 029 (neg))

42*[from page 35]*

YOUR ANSWER: A right angle is 100° .

No.

A right angle is sometimes called a square angle. The floor of a room makes a right angle with the wall. When something stands "straight up", it makes a right angle with level ground.



The unit of angle measure, the degree ($^\circ$), is so chosen that there are 90° in a right angle. (This unit of angle measure started with the ancient Babylonians.) Your answer, 100° , would be a larger angle than a right angle.

Now return to the question on page 35 and try again.

(img 1018 Crowder, Trig, p 042 (neg))

Many such branching programmes were published. They are today available under the brand name "Gamebooks", i.e. still available (!), and it will be useful to my readers to see the great range of topics available. We have taken this list from:
<https://gamebooks.org/Series/457/Show>
 (downloaded on 2020-03-30)

1. The Arithmetic of Computers
2. Adventures in Algebra
3. The Elements of Bridge
4. Introduction to Electronics
5. Practical Law: A Course in Everyday Contracts
6. Trigonometry: A Practical Course
7. Basic Computer Programming
8. The Meaning of Modern Poetry
9. Parliamentary Procedure
10. Practical Mathematics
11. Proper Punctuation

12. The Slide Rule
13. Your Life Insurance
14. Advanced Bidding
15. Effective Executive Practices
16. Effective Writing
17. Fractions: A Basic Course in Arithmetic
18. Fundamentals of Electricity
19. The American Constitution
20. Better Business Organization
21. Computer Programming Techniques
22. Decimals and Percentage
23. Electron Tubes at Work
24. Understanding Shakespeare: Macbeth
25. The Art of Delegating
26. Business Letter Writing
27. Understanding Stocks
28. Chemistry
29. Essentials of Music
30. Introduction to Genetics
31. Fundamentals of Transistors
32. The Game of Chess

AN INFORMAL EXPERIMENT WITH A CROWDER PROGRAMME

(Running commentary on a branching programme (Trigonometry, by Crowder and Martin))

I asked a friend, adult, non-mathematician, long past her school days, to work through the programmed trigonometry course by Crowder and Martin (1962) for me to see how she fared with this style. Let's call her "guinea pig" (GP). We have underlined the few pages on which GP made mistakes (apart from commenting on them).

GP worked through 71 pages (with a multiple choice question on each page) and made mistakes on only 3 pages. The pages are, of course, "scrambled", and her sequence of pages was as follows: 1 (ch 1: Using ratios and proportions), 4, 10, 16, 18, 22, 27, 35 (ch 2: The importance of the right-angled triangle), 38, 41, 46, 40, 36, 62, 52, 47, 55, 56, 50, 57, 66 (ch 3: Understanding sines, cosines and tangents), 70, 77, 81, 73, 85, 90, 87, 95, 99, 96, 101, 104, 111, 107, 102, 117 (ch 4: How to use the tables of trigonometric functions), 123, 129, 133 (GP made a mistake on p 133), 140 (p 140 is a remedial page), back to 133, 137, 145, 130 (important information on p 130, which has to be remembered), 138 (GP made mistake on 138), 152 (remedial page), back to 138, 142, 147 (important information on p 147), 141, 153, 154 (154 contains a test consisting of 8 problems, with answers given on the opposite page)

GP solved 4 problems fairly easily, and correctly, but felt diffident about the remaining questions, did not remember well

enough how to tackle them. Some previous information only "understood" but not practised. She therefore decided to work through the whole programme again, paying more attention at critical points. When she returned to p 154, she was able to solve 7 of the 8 problems correctly, but still felt unable to solve problem 8.

This demonstrates the difference between "understanding" and "mastery". Both are required by students, and school must therefore make provision for both. METAL does that. The "Groundwork" phase produces understanding, "Conversation" makes Understanding alive, Practice and Revision lead to mastery. All are essential ingredients of learning.

GP decided to continue with the programmed book, a risky thing to do since it can lead to an "accumulation of ignorance", which has been the downfall of so many students, once they have missed an essential point. GP now tackled the following pages:

157 (ch 5: Reciprocals and Interpolation): 161, 166, 159, 170, 164, 168 (important information), 179, 176 (made a mistake on p 176), 180 (remedial page), back to 176, 185, and that's where she is now.

Only 3 mistakes on 71 pages: that speaks well for the programme. It might be useful in the research school. But why was GP apparently getting "stuck"? (That might also happen to my students. Probably it would.)

GP noted: "I need something for my imagination as from here. I am tackling the problems only in a rational (mechanical) way, manipulating the symbols and the fractions laboriously without visualising what they mean. This often produces the correct answers, but is not really the approach of an EXPERT, who not only does the correct manipulations but also has an instinct which tells her that she is on the right track."

After further thinking, GP commented:

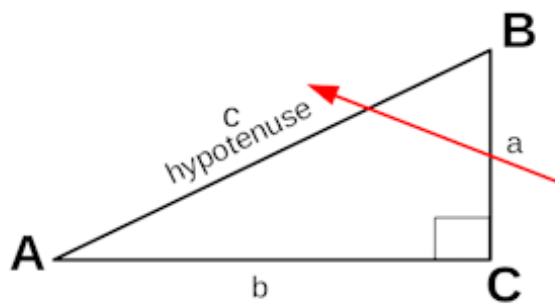
"The kind of questions on these pages (e.g. p 168) which I find difficult to answer without tremendous effort and trial and error are:

- (a) Are sine and cosine each never greater than 1?
- (b) Are secant and cosecant each never less than 1?
- (c) Are tangents and cotangents each never less than 1?

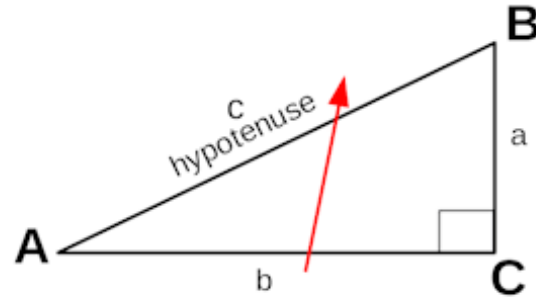
I never see the functions in those terms, because I do not see the fractions as being bigger or smaller than 1. I simply manipulate the symbols and accept the results. But I have to see them in those terms in order to answer such questions. I think I need more practice in visualising decimal fractions (like 0.75), as simple fractions (like $\frac{3}{4}$). I have figured out, LOL, that in a/b , if "a" is bigger than "b" (if $a > b$), then the result is bigger than 1. That's what I have to get into my bones."

So these were some of GP's problems at this stage. Surely at least some of the students at school would have similar problems but be unable to formulate them so clearly.

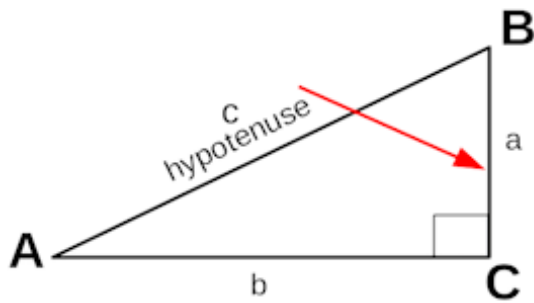
In response, I created a crib-sheet for GP, which depicts the trigonometric functions all on one page, arranged in such a way that they make the relationships as visual as possible and facilitate comparisons.



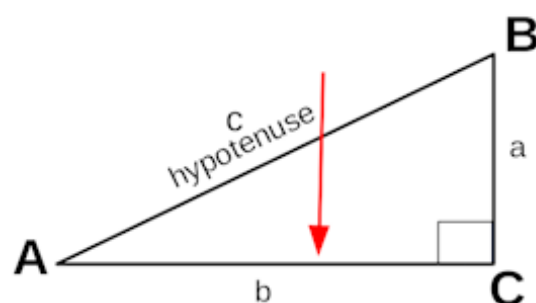
$$\sin A = a/c = \text{op/hyp}$$



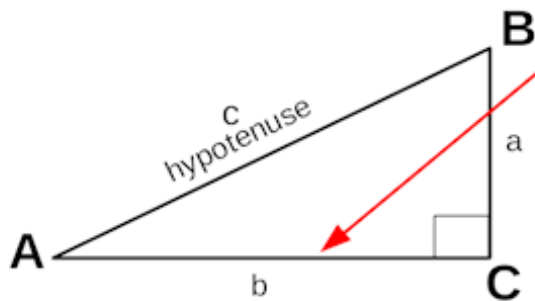
$$\cos A = b/c = \text{adj/hyp}$$



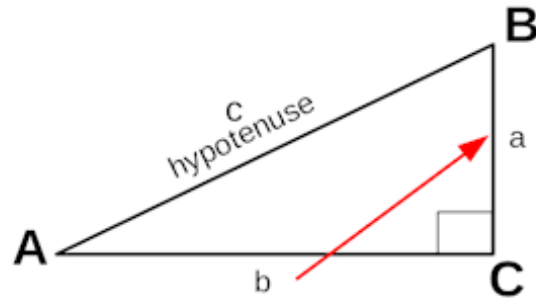
$$\csc A = c/a = \text{hyp/op}$$



$$\sec A = c/b = \text{hyp/adj}$$



$$\tan A = a/b = \text{op/adj}$$



$$\cot A = b/a = \text{adj/op}$$

Trigonometric Functions

Crib sheet: All triangles

(img 1033 All triangles, 600x605)

This crib-sheet is a starting point. There is no guarantee yet that it will give GP the "imagination" that she lacks, but it is a first step. A live teacher may help at this point, but we cannot be sure that he will succeed. What is definitely required at both of the problematic pages, p 154 and p 168, is **practice**, i.e. 40, 80 or more problems similar in nature. It is possible that GP (or my students) will, while handling these problems, one after another, first very laboriously, then with more and more

ease and speed, will discover that "imaginative concept" which they seek.

This is similar to what happens when you move to a new town, and during days, weeks and months gradually develop a sense of where streets and important buildings are, until you find them instinctively.

This is what GP should acquire, and wants to acquire, and this is what my students need before they can say that they have "mastered" this aspect of the trigonometric functions.

TRY TO CREATE THIS "INSTINCT" DURING "GROUNDWORK"

Every effort should be made to give it to them during the "Groundwork" and during the "Conversation" phase.

PRACTICE HELPS

But Practice will also contribute. Practice has to be continued (i.e. enough sample problems with solutions have to be provided; however many are needed) until the student has achieved this.

Therefore a large number of problems with solutions have to be devised, covering the topics discussed in the book up to p 168, from all conceivable angles.

The rules about Practice (the practice algorithm, which controls the sequence in which the problems are to be tackled) (see Practice below) specifies that the same problems (and many problems of the same type) have to be tackled over and over again, until the student can solve all of them, at ease and with reasonable speed (not like a racer, but like a steady unperturbed walker). One would also consider whether Gilbert's techniques could be used to tackle this problem. The Crowder and Martin programmed book have missed this point. They, wrongly, take it for granted that the student looks at the functions in this way and does not nearly manipulate the symbols.

DO OUR STUDENTS DESERVE THIS EFFORT?

"Are you out of your mind?" I hear a colleague shouting. "That is too much of an effort."

Is it really? Is there any justification for leaving a student ignorant (especially after she has been sitting in one of our classes), or leaving her only half-competent? Half-competence makes her skill entirely useless. Do we want a half-competent surgeon, or a half-competent bomb disposal expert? Why teach the student trigonometry (or whatever subject) at all, if at the end of our teaching, she cannot put her skill to practical use!

DO NOT LET THE PROGRAMME WRITER OFF THE HOOK

My suggestion that Practice might solve the problem of creating an "instinct for trigonometry", does not let the programme writer off the hook. Assuming that we are using this trigonometry programme (and that we divided it into 15 minute modules in order not to overburden the students), then, if we find our students facing similar problems to those my friend faced, and similar needs, there is no point in abandoning this particular programme. After all, it has served well up to p 154 or p 168. But we now have to consider what we can do to provide the insight that my friend lacked. It might take considerable effort to find out how

to do it. (I don't have a clue right now of how to do it.) But once we have found a way, it can be incorporated into a computer-based programmed module.

If the programme writer cannot teach the student to view the functions in this light (as discussed above), the programme writer who has an unlimited amount of time to think, to try to fail, and to experiment, then a live teacher cannot possibly do better.

Remember:

1. Do not criticise an imperfect teaching programme, do not abandon it, but **IMPROVE IT.**
2. Do not on any account leave a student with her ignorance or lack of competence.
3. It is your duty to make sure that the student learns.

^==== PRINCIPLES OF GOOD TEACHING: CROWDER STYLE ==== ENDS

^==== 070-EXAMPLES FROM PROGRAMMED BOOKS ==== ENDS

((((((

080 Details of practice algorithm - insert here

090 Details of revision schedule - insert here

095 How to keep manual revision diary - insert here

^==== 110-MOPPING-UP SECTION ==== STARTS

SOME BITS AND PIECES I MAY HAVE FORGOTTEN ELSEWHERE

HISTORY: OUTDATED MEDIA

When Programmed Instruction started to be developed and used, the Teaching Systems **T** (media) were books, teaching machines, tape-recorders, cassette recorders, overhead projectors, slide projectors, etc.



Teaching machines for linear programmes Teaching machine for branching programmes

Today all their functions can be handled by computers and books. Here are two examples.

PROGRAMMED INSTRUCTION GONE OUT OF FASHION

Programmed Lessons have, unjustifiably, gone out of fashion, and in new lessons available through the internet, the psychological principles of Programmed Instruction have often been ignored. The reasons for the regrettable disappearance of teaching programmes from schools have been discussed by Casas (2002). They are too profound to be discussed here. But they do not reflect well on the teaching profession. Teachers and teacher trainers (and the academics influencing them) have often been attracted and misled by the many glitzy technical innovations which have been created since the 1950's when programmed instruction flourished and even by the power offered by computers, forgetting about psychology of learning and measurement of results. There are situations when the teacher can no longer be held accountable for the success of her students, and the success of the students cannot longer be measured.

PROGRESS AND SUCCESS SHOULD BE MEASURED

I, in line with Frank and others, feel that progress and success (or failure) should be, and can be, measured, and that doing so will encourage teachers and students alike to perform to the best of their ability. Teachers (or schools) should be held accountable for the performance of their students.

LEARNING PROBABILITY P (= STANDARD P) DEFINED

We view the subject matter as a set of relations (countable tasks, or procedures), where the teaching system **T** is responsible for ensuring that

- given 100 students confronted with one task, $p\%$ have mastered it;
- which is the same standard **P** which guarantees that any one student confronted with 100 items has mastered at least $p\%$ of them.

EXISTING PROGRAMMED LESSONS IN BOOK FORM

Many good Programmed Lessons (from the olden days) are in existence (there were hundreds of them) and are gathering dust in the publishing houses and the basement stacks of libraries. They could be resurrected. And more Programmed Lessons should be developed. Samples of two types of Programmed Lessons in book form are Young (1966), Scales (1970) and Crowder and Martin (1962), from which the pages shown above have been taken.

RESEARCH LITERATURE

The research literature on Programmed Instruction is huge and informative. A good starting point is Lumsdaine and Glaser (eds) (1960) and Smith and Moore (eds) (1962).

Some of the principles of programmed instruction:

1. Match lesson with prior knowledge of student
2. Specify behavioural objectives (Mager 1962)
3. Small teaching steps
4. Frequent responses
5. Immediate knowledge of results (Right, or Wrong)
6. Test and improve lessons (again and again) until they produce the specified results

PRIOR KNOWLEDGE

Each Programmed Lesson specifies what Prior Knowledge **PK** the Learner must have when she starts working with the programmed lesson. Only if she has this knowledge (and skill) can she work successfully with the Programmed Lesson. A Prior Knowledge test

(pre-test) establishes whether the would-be learner has the required knowledge.

If she does not have the requisite **PK**, she is not allowed to work through this Programmed Lesson and has to acquire the necessary knowledge from other sources, e.g. other Programmed Lessons.

FAILURES OF RESEARCH SCHOOL

This is a far cry from what happens at the research school. In the school it is believed that the English "creative" and "child-centered" and "discovery" approach to learning is vastly superior to the Slovak approach. It appears (if we observe the results) (but can it be true?!) that the research school believes that it is better to let the Roma students fail in the English environment than to teach them with methods appropriate to them). Or is it merely for organisational or financial reasons that Roma children are not taught in a way appropriate to them and their Prior Knowledge **PK**?

Learners who satisfy the initial specification are called the Target Population of this Programmed Lesson. Every Programmed Lesson suits a specific Target Population.

TESTING OF PROGRAMMED LESSONS

During the development phase of the Programmed Lesson many members of the Target Population are allowed to work through the Lesson, have to answer a question or carry out a task on every step along the way. All their answers are recorded. If more than x% of the learners make mistake at a certain point, this step is considered ineffective and will be replaced. (Note: When the student makes a mistake, it is the teacher's fault, not the other way round!)

MAKING THE PROGRAMMED LESSON PERFECT

For example, an explanation can be reformulated, or additional teaching steps or illustrations or animations can be inserted to make the step easier to understand. Or the student could be given prompts to help her find the correct answer. Information from earlier steps which the student has forgotten can be repeated more often, or in different guises, to make sure the student remembers. All these points are discussed in the literature on Programmed Instruction, which is huge.

MENTAL SPORT

The teacher's job is also to encourage in the children an attitude that everything they do in these lessons, from English, to maths, to history, to everything, is a thrilling game (like training in sport), with tasks in which everyone can succeed

through practice, that practice is fun, and that practice leads to improvement, etc. etc. You could call these games "mental sport". There is no reason why not all activities in school (taught to the highest standards for all) should not be seen like this, by children, teachers and parents alike.

INCENTIVES

Teachers are less efficient and less thoroughly prepared than programmed lessons. Therefore children who fail when the teacher teaches them can succeed with a programmed lesson. How long the children can spend in front of the computer depends on the quality of the programmed lesson (which can be improved if required), on the skill of the teacher, on what she says to motivate the child, and many other factors. There will be teething problems, but where there's a will, there is a way. A child may be given a five-minute break in the playground after having successfully completed a module, and teachers can think up other incentives. (Read Skinner's books about the importance of finding suitable incentives, which he calls "reinforcements".)

MICRO-LESSONS

In the past, Programmed Lessons were often published in book form. That meant that, to be economically viable, the book had to have a certain number of pages (say at least 32) and a certain price. But with computers it is possible to develop micro-lessons, covering just a few subject matter elements for students who have learning difficulties and need encouragement.

Let's assume that in a history lesson, the teacher's objective is that the student can successfully answer just ten questions, perhaps 20 if reasons for historical events and supplementary questions are to be covered. Then, for that lesson content, just one teaching programme should be available. (A programme in book form would have to cover a term's work in order to be commercially viable. But on the computer, lessons for very small subject matter areas could be created.)

Assuming that a topic is generally taught in a conventional class, a programmed module could be used for children who have missed that class, or who have not mastered the topic up to the required standard in class. They could then go over the same ground again with a programmed module to reach the required standard of, say, 90%. Children can do this voluntarily, but their ambition should be stimulated. The teachers should tell them that they too can do as well as anybody else: "All you have to do is do the computer lesson. It is dead easy. Have a go!"

There is no subject
which Programmed Lessons cannot make
easier and smaller,
to give a student a good start.

This sentence delivers the right message and should therefore stand. But something has to be added in small print. It goes mainly for subjects where the student has to display her knowledge and skill by writing or drawing something. It does not apply to sports (football, athletics), or cookery, or knitting, or driving a car. But when it comes to knowledge about the theory of these subjects, to writing and talking about them, then programmed instruction can be used, the lessons can be made as easy as any student requires. Note also that programmed instruction (METAL-Groundwork) is only the first component of METAL, and that mastery is only achieved by all components working together.

With Programmed Lessons, there is no subject which cannot be made easier, and smaller, to give a student a good start. A teacher would not have the patience (and the time) to make things as simple as some students require. The teacher then says: "This student is unteachable". But this is hardly ever the case. Usually it is the teacher who is not able, or not willing, or does not have the time, to make things as simple as the student requires.

Below, the section called "Alphabets for Sinners, Saints and Winners" demonstrates the amount of detail into which, unlike a teacher, a programmed lesson can go to make things easier.

LESSONS FOR STUDENTS WITH DISABILITIES

Lessons can be developed for students with special disabilities, e.g. hearing problems or colour blindness.

KISS: KEEP IT SIMPLE STUPID

Concerning gradual simplifications in the effort to find a suitable starting point for a student, let us assume we have an exercise consisting of 10 tasks (questions and answers on a topic, spelling, foreign language vocabulary, etc.). If the student finds 10 tasks too difficult to pick up and remember, the teaching algorithm can concentrate on 3 tasks and then gradually add to these until the 10 tasks have been learnt. If 3 tasks are too difficult, the teaching algorithm reduces the lesson to 2 tasks. If two tasks are too difficult, concentrate on one task, and let the student just fill in one word at a time. If one word at a time is too difficult, let the student fill in one letter at a time.

If writing one letter is too difficult, give the student recognition exercises. All this can be done with programmed micro-lessons. **IT IS UNFAIR TO SAY ROMA STUDENTS CAN'T LEARN.** They can. They just have to be taught properly.

For such students micro-lessons in the Programmed Instruction format can be developed and they can be used again and again.

BUILDING UP A LIBRARY OF MODULAR LESSONS

What is then required for my school (and for all such schools) is a library of Programmed Lessons. This can be built up gradually. Lessons can be downloaded from the internet so that they do not suddenly disappear. Existing Programmed Lessons in book format can be obtained from libraries and publishers and, with the permission of publishers, be converted into a suitable computer format.

TEACHERS DEVELOPING PROGRAMMED LESSONS

When ready-made Programmed Lessons are not available, teachers can develop them.

But here is a note of warning: During the hey-day of Programmed Instructions many ill-trained and amateurish teachers tried their hand at writing Programmed Lessons, ignored the psychological principles, did not test (validate) them as required, and the programmes therefore did not produce required results. This is one of the reasons (but only one of many!) why Programmed Instruction got a bad reputation and gradually disappeared.

"Programmed Instruction's Fall From Grace: Researchers attribute the demise of the teaching machine movement to three major factors. ... in keeping up with the demand for new programs, many programmers ignored the mechanics of programmed instruction and began producing inferior programs ... " Casas (2020)

If good Programmed Lessons are prepared, over the years the stock will increase. They can also be developed in cooperation with other schools. There is a platform called Moodle (see Wikipedia) which offers a large number of different programming styles (teaching algorithms), empty shells into which teachers can put their contents. Moodle then acts as a Teaching Algorithm and interacts with the student.

^CLARIFICATIONS

PAUL GOODMAN'S (1964) CRITIQUE OF PROGRAMMED INSTRUCTION

Some of Groundwork's techniques are derived from principles emphasised (or discovered?) by B F **Skinner**. The same techniques are recommended here and there by other more recent popular educators without mentioning Skinner from whom they were apparently derived. I felt it necessary to defend Skinner against such deliberate suppression of his name and achievements. NAQ-02 (In defence of Skinner)

When formulating METAL I felt no need to omit references to classical **programmed instruction**. I was neither shy about them nor hostile to them. On the contrary, I felt that

- the early successes of programmed instruction,
- its then popularity,
- the great quantity of teaching programmes on many subjects published in many countries,
- and the great number of variants experimented with at the time

would help to bolster the validity and feasibility of METAL.

In view of the points made by **Goodman** (and not doubt by many others unknown to me), we have to spell out some clarifications.

1. **NO COMMITMENT TO BEHAVIOURISM**

We were careful not to use provocative behaviourist terminology, such as "shaping behaviour". We are not subscribing to any particular school of psychology (least of all to behaviourism). Like Gilbert (in METAL), we are not concerned with any ideology but only with effectiveness of teaching: that's what the Roma children need.

METAL does not subscribe to any specific psychological model. It is motivated merely by **success**. Gilbert is given as an example that in METAL **anything** is permitted, provided it "works", i.e. enables the learner to succeed.

2. **ABLE STUDENTS CAN JUMP GROUNDWORK**

If a student does not need Groundwork to be fully prepared for Conversation, she jump Groundwork, e.g. by reading a summary, or relevant books, articles, or web pages. In brief, students who do not need the principles of programmed instruction can bypass them. **Success** is all that matters.

But students who can not fully participate in Conversation because the basic skills or basic information are missing, will be given the chance to work through as many Groundwork

models, at their own pace, as are required.

The purpose of this provision is to ensure that no student, e.g. no Roma student, is left behind; no Roma student is allowed to fail.

The main purpose of METAL and of Groundwork in particular is to prevent failure. By contrast, failure is a permanent experience of Roma students in the research school.

METAL has been conceived for three situations:

WHILE COMPULSORY SCHOOLING CONTINUES

- a) To improve teaching and learning of Roma students in the present school set up (compulsory schooling with Roma students often on the move)

IF COMPULSORY SCHOOLING WERE ABOLISHED

- b) To serve as a reliable and free resource for learning any skill and subject under the sun in combination with "extended public libraries" (in place of schools), in the unlikely event that compulsory schooling were abolished. All avenues to learning would then be open to learners. For some subjects METAL and Groundwork are not suitable, and therefore other approaches will be used. We shall not argue with Goodman (and others) about that.

For some subjects, learners have the option of acquiring the desired skill through METAL or by other means. But nobody should be deprived of success because of unsuitable teaching methods.

The school has to find a way,
by hook or by crook,
by METAL or wood,
of enabling the student to learn what she wants to learn, to pass the tests or exams which she wants to pass. This is the duty of the school. METAL is one of the means available, and I think it is a pretty good one.

COMBINE METAL AND OTHER TECHNIQUES

For some subjects, a combination of METAL and other techniques can be used.

Note: Most of the tutorials and presentations at present available at the internet (many of them beautiful and excellent in clarity) do not satisfy the principles of METAL, e.g. small steps, frequent responses, immediate

knowledge of results, elimination of bad teaching steps.

They are therefore **not suitable** for the lowest achievers. Goodman's assumptions about students' curiosity and ability to learn are too fanciful (pipe dreams) and apply only to the high achievers. By contrast, the purpose of METAL is to ensure that **everybody** can succeed, even the much neglected Roma children. METAL is a safety net.

c) **HOMESCHOOLING DURING CORONA VIRUS LOCKDOWNS**

At present (years 2020 and 2021), because of the virus crisis, many schools are closed or only partly opened, many teachers have to teach online (very stressful and difficult for them too), and many parents have to teach their own children. In such a situation (which might become the standard in future years), a **vast supply of METAL lessons** (carefully prepared in accordance with METAL rules!!) would be eminently useful. (E.g. reading and writing in Slovak, reading and writing in English, English language lessons for Slovak children, "all" subjects in Slovak, "all subjects" in English, bi-lingual stories, books and lessons in Slovak and English, lessons of specific interest to Roma children in Slovak, in English and bilingually.)

As Gilbert in METAL shows, **any** good teaching technique, including anything that Paul Goodman might have recommended, can be absorbed into, and combined with, METAL lessons without breaching METAL principles.

Take for example a good BBC Schools TV programme, presented by a popular scientist (say David Attenborough). It can be **combined** with METAL Groundwork.

Some students view the TV programme and then proceed to Conversation and eventual to Test.

Students who do not remember enough and cannot answer questions or discuss matters after viewing the TV presentation can work through the Groundwork lessons written to accompany the TV programme. They can then view the TV presentation again (and do both as often as they wish, until they have **mastered** the topic) and then proceed to Conversation.

Every student should feel equally competent when arriving in Conversation. (Let us stress, that we are thinking especially of the needs of the **Roma** children.)

Remember: **Any method** and approach can be absorbed by METAL and incorporated into it. The only objective is a **success rate** of 90% or more. Any METAL lesson which does not achieve this has to be **improved** until it does. Any **failure** must be **blamed on the lesson** and not on the learner.

d) **IF COMPULSORY SCHOOLING CONTINUES**

In the **most likely** event that the present system of compulsory schooling stays in place, the free availability of **thousands** of lessons **following METAL principles** will enable the research school (or any school) to make gradual improvements. METAL sets up an ideal towards which we can work.

Something along the lines of **Wikipedia** (with its continuous improvements), or Project **Gutenberg**, or of the **Linux** operating system, where different versions and different add-ons compete with each other and the best survive, could be considered.

Roma students (and every human being) should have **free and password-free** access to these lessons from schools or from home as they **move** from town to town or country to country.

^Paul Goodman's (1964) critique of programmed instruction

PAUL GOODMAN'S (1964) CRITIQUE OF PROGRAMMED INSTRUCTION AS PRESENTED BY RESNICK (1963)

Programmed instruction as described in Chapter 6 of Goodman (1964) and based on Resnick shows similarity with **brainwashing**, and I reject such techniques and ideologies outright.

As I stated elsewhere, I greatly sympathise with the attitudes of Goodman, Illich and their "deschooling" friends. In chapter 6 of Goodman 1964 (Compulsory Miseducation), Goodman strongly, and rightly, criticises the ideologically motivated defenders of Skinnerian programmed instruction. In NAQ-02 (In defence of Skinner), I defended Skinner against unfair attacks. My argument was as follows: The fact that Skinner (and his followers, e.g. Resnick) made some exaggerated (and inhuman mechanistic) claims does not mean that **all** teaching principles invented, or recommended, by Skinner are invalid or dangerous. Some authors which use and recommend Skinnerian techniques, e.g. Rosenshine (2008), Solity (2008) and Michel Thomas use Skinnerian techniques but, sadly, do not give credit to Skinner.

METAL-Groundwork utilises some of Skinner's techniques and gives examples of Skinnerian teaching programmes. When I described METAL, I had the option of hiding my debts to Skinner and his school (for fear of criticism from people who disagree with Skinnerian fundamentalists) or to acknowledge that some of the techniques used in METAL-Groundwork have been recommended by Skinner, in addition to being plain **common sense**.

I therefore stress here that Goodman's criticism of Resnick does **not** apply to METAL-Groundwork. Groundwork offers much more than the Resnick programmes criticised by Goodman. Groundwork modules are meant to be used in combination with other techniques of presentation and to be followed by the other stages of METAL (Conversation, Practice, Retention) which do not have the slightest connection with Skinner and his ideology.

My description of METAL contains examples of non-Skinnerian types of programmed instruction (Thomas F Gilbert, and Crowder) and leaves the door open for re-introducing any of the other techniques of programmed instruction, or self-instruction, experimented with in the heyday of programmed instruction.

Goodman's **concluding paragraph**, which gives wholehearted support and praise to one idea of Resnick, also tallies with my reasons for developing METAL. **If** a child can learn by "conventional" methods, or can learn on its own with standard books or standard lessons as they are now available on the Internet, or in any other way, there is no reason, which this child should be **forced** learn with METAL. These are the children described by Goodman as "bright". But even "bright" children should be allowed to learn the METAL way if they enjoy it.

But **if** any child is **in danger of failing** or learning nothing or not enough, as most Roma children and many non-Roma children at the research school are, they should be allowed to learn with METAL methods, and start that way even before they fail. METAL also supports the itinerant lifestyle of many Roma.

If a child gets bored with METAL and rejects METAL learning, she should be allowed to do something else. But on no account should she be **condemned to failure** as so many Roma children are.

In brief, my specification of METAL has taken care of all the objections raised by Goodman.

We do not subscribe to the **philosophy** of Skinner but we use some of his **techniques**.

Remember:
There is nothing that a Roma student cannot learn.
Just start her at the right level
and teach her patiently,
e.g. with Programmed Lessons.
Don't throw them in at the deep end,
as is happening now.

^Bibliography

See separate link online: -
www.tudo.co.uk/kubalova -
Then click on Bibliography

Klaus Bung - A practical guide to the IDYLL METHOD (Mk 3)
171 pp, 39,000 words

INTRODUCTION
BY LUCIA KUBALOVÁ (APRIL 2022)

Dr Klaus Bung kindly supplied me with an unpublished manuscript prepared for other purposes. This is therefore entirely written in the first person singular ("I ..."). It is very practical and goes into great detail.

It is addressed directly to students who want to use the procedures which METAL recommends for METAL-P (Practice) and METAL-R (Revision).

It shows in detail how to commit information (data) to memory which teachers or the students themselves have extracted from textbooks and other sources and have been brought into Question-and-Answer form, i.e. into the "Catechism Format". No computer programs are required.

For implementation in schools, I suggest one of the following approaches.

1. Run a course for a handful of interested teachers and let them try the technique for themselves for some weeks or months, meanwhile correcting any misconceptions and technical mistakes which might occur.
2. Pick one or two interested students (from the best or, ideally, the worst). And teach them the method, starting with the simplified versions and proceeding to the "preferred" versions, the standard versions.
3. If parents are interested, invite the parents together with their children. Keep the groups small, e.g. no more than two families at a time.
4. Let the initial learners use the method for several months and gradually perfect their techniques and wait for successes to show. Wait for them to become devoted practitioners.
5. Then invite two more students to join the initial groups. Look for children who are clamouring to learn this successful technique.
6. Very gradually offer it to other students who have particular difficulties with a certain subject and are keen to get better. (e.g. spelling)
7. Wait for the students who have been initiated to be approached by others who want to know the secret of their success. Let the method gradually spread (go viral)

throughout the school. Do not **force** it on anybody, do not even impose it on anybody. Let students **beg** to be taught the technique.

8. Reward all successes, even small ones, with **Certificates of Merit**. Hope that some students will want to learn the technique because it is a sure means of earning Certificates of Merit, which they can show to their parents.

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79. Non-algorithmic components of the IDYLL METHOD
80. SENTAL: How to adapt language elements for your personal use
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82. The conflicting requirements of "ease of learning" as opposed to usefulness
83. More on Environmental Language Learning
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85. How to extend and enrich your command of the language
86. How to fail a language exam
87. The DIARY METHOD: How to compensate for the lack of speaking partners
88. 1. Mental language practice
89. 2. Writing a diary
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LIST OF ABBREVIATIONS (ACRONYMS)

DIARY METHOD: a technique for intermediate and advanced language learners

ENFA: Enforcer Algorithm, the procedure for items or exercises of extreme difficulty. (This is related to ERB and ICE.)

Environmental language learning: A technique for beginners, intermediate and advanced students

ERB, the Extraordinary Rendition Book. This used to be called "Auffang-Übung" (collecting tray for difficult items) in German. ERB is a handwritten notebook in which "difficult items" are collected until it contains 10 items, i.e. an exercise is complete. Then this exercise is "dispatched" on the standard course of 8 revisions, following the same rules as new exercises (normal exercises). The items contained in ERB have to be revised daily until the exercise is complete and is dispatched.

ERB: the Extraordinary Rendition Book. This is related to ICE, or German "Auffang-Übung" and to ENFA, the Enforcer Algorithm.

ICE: Intensive Care Exercise": Intensive Care: If the student makes 1, 2 or 3 mistakes at R4 or later, these items are deemed to be "difficult items", and the student copies them into an "intensive care exercise". He then revises this exercise daily until it is full, i.e. until it contains ten items. This is related to ENFA and ERB.

IDYLL METHOD: IDYLL = Institute of Dynamic Language Learning

LASPEX - Learning algorithm for spoken exercises (used with sound recordings, e.g. in the mp3 format)

LASPEX-BASIC - A simplified form of LASPEX to give learners an easy start

LASPEX-INTERMEDIATE - More efficient than LASPEX-BASIC but slightly more difficult to learn

LASPEX-PREFERRED - The ideal form of LASPEX. Much more efficient than LASPEX-INTERMEDIATE but more difficult to learn.

METAL: **M**odel for **E**fficient **T**eaching **A**nd **L**earning: A model created by Lucia Kubalová by integrating

her own ideas about METAL-A (Agreement) and METAL-C (Conversation)

with the traditional techniques of Programmed Instruction in METAL-G (Groundwork) (e.g. Skinner, Crowner, Gilbert, and

others)

and the memory techniques (the so-called IDYLL METHOD) of Dr Klaus Bung.

A systematic exposition of the IDYLL METHOD has been provided by Dr Bung himself and appears at the end of this file. It contains all the **technical information** required to put the technique into practice.

PAPA - Pencil and Paper Algorithm: The procedure used in METAL-P (Practice) for initial learning. It ensures short-term retention. It will also be used in METAL-R (Revision) to ensure long-term retention.

PAPA-BASIC - A simplified form of PAPA to give learners an easy start

PAPA-INTERMEDIATE - More efficient than PAPA-BASIC but slightly more difficult to learn

PAPA-PREFERRED - The ideal form of PAPA. Much more efficient than PAPA-INTERMEDIATE but more difficult to learn.

REV: Revision algorithm. This specifies the optimal dates of revisions and ensures long-term retention.

REVISION DIARY: A notebook or computer file in which you keep track of your revisions

SENTAL: Sentence Algorithm. A procedure for intermediate and advanced language learners. Very useful also for Roma students learning English to improve their spelling and grammar in a systematic and practical way.

TRAM: Transcription Method to improve listening skills: This is a technique for advanced students of foreign languages, including English for Roma students.

Klaus Bung:

How to learn any language and remember 90%:

A practical guide to the IDYLL METHOD

Part 1: Why it works: The theory

==== PART 1 ==== STARTS

PART 1: WHY IT WORKS: THE THEORY

INTRODUCTION

As a rule, teachers and learners grossly underestimate the number of revisions which are necessary for successful learning, and they know absolutely nothing about the correct timing of revisions. They then blame the resulting failures on the non-fact that languages are difficult or that the learners lack talent or dedication. Neither claim is true. No language is difficult if handled with the right methods. Every student who seriously wants to learn a language can do so successfully, provided he is given the right tools and uses them as instructed. Talent does not come into it. Diligence and self-discipline does.

This guide describes explicit procedures (learning algorithms) which can be taught to learners and help them to efficiently absorb vocabulary, idioms, grammar, foreign scripts and factual information. Learning algorithms shift the emphasis of work from teaching to learning, from the teacher to the student, who is responsible for his own progress and is given the learning algorithms as his most important tool. If parents have been trained, they can help their children apply the algorithms. No physical tools other than pen and paper are required.

The algorithms discussed control initial learning, leading to a retention span of 5 to 15 minutes. They then dynamically stretch this span over a period of 8 months or longer, increasing or decreasing the revision intervals for each item (e.g. vocabulary item) depending on the learner's performance. These algorithms are therefore called "dynamic" and "adaptive". Learning algorithms are the engine at the core of the IDYLL METHOD. In opposition to the silly advice "Revise as often as possible" which teachers often give to their students as a recipe for success in language learning, the IDYLL METHOD proclaims "Revise as little as possible (but as often as necessary)". Another maxim of IDYLL is: "You can minimise the time you invest in learning by revising before you forget rather than after you have forgotten, and by revising as late as possible but not so late that you fall into the abyss of forgetting" (since revisions done before forgetting take much less time than revisions done after forgetting).

The target standard is always 100%, and the actual retention attained is always 90%. Special revisions before tests and exams are not necessary. The student is always well prepared, even though he "knows neither the day nor the hour" (Matthew 25:13).

Working to these high standards actually minimises learning time. Certain constants in the procedures can be adjusted (external adaptation) to allow for difficult languages, or slow learners, or for people who are fast learners and fast forgetters.

In traditional teaching and learning, success and retention is largely random. The teacher explains and practises, somehow, a large amount of information. Some of it (quite unpredictably) falls on stony ground, and some of it (50% or whatever the figure) is retained by some students but not by others. The effort in so-called teaching (presenting and practising) information which is then forgotten is completely wasted in respect of the student who has forgotten it. By contrast, everything that is controlled by the IDYLL METHOD is entirely predictable. Each student receives only a limited amount of "information" (skills), but he is expected to remember (perform) 100% of it. IDYLL does not try to teach what will not be remembered. Analogy: Traditional school teaching is like a carnival procession at which fistfuls of sweets are thrown into the crowd. 50% fall on the ground and are trampled on, and 50% are caught by joyful children. This is unavoidable, and perhaps even part of the fun, in a carnival procession, but it is not appropriate in education; for the sweets which fall on the ground mean failure and frustration, sometimes for life. By contrast, the IDYLL METHOD makes the children queue, open their hands, and gives them the sweets one by one. We call this "child-centred teaching"!

More information can be found on the Internet (www.rtc-idyll.com) and in printed publications.

CARTESIAN LANGUAGE LEARNING

The algorithms discussed here are part of the Cartesian approach to language learning (but not by far all there is to it), which is characterised by the following features:

1. The main effort is shifted from teacher to student; it is a learning method, not a teaching method. The responsibility for successful learning is with the student and only to a limited extent with the teacher. The teacher becomes an informant, not the driving force of the process. The student becomes a kind of suction pump trying to get out of the teacher and out of books as much information as he can. This information (= skill) then has to be absorbed and retained by the student, and our algorithms control in every detail how this is done.
2. The subject matter (in our case vocabulary, grammatical forms and sentence fragments) is broken down into small fragments, called items. This is typical for the Cartesian method.
3. The items are arranged into increasing order of difficulty (Cartesian method).
4. The various part-skills, and learning and teaching techniques, are carefully and rationally balanced (an

engineering job) so as to achieve the intended goal and guarantee success. No one technique is used exclusively. Different techniques are used for different, precisely specified, purposes.

5. Nothing is left to chance, whereas in traditional teaching virtually everything is left to chance. The teaching steps are carefully planned, evaluated and improved, in the same way in which you develop and test a computer program until it reliably does its job: This is "programmed instruction" (programmed learning) (Lumsdaine and Glaser 1960).
6. When a computer program delivers the wrong results, you do not blame the keyboard operator, or the dead patient whom you have killed by calculating the wrong dosage, but the programmer.
7. Problems which arise are resolved by detailed analysis.
8. Some of the techniques used are algorithms and core parts of the method. Others are in the nature of preferences and recommendations. They are discussed in Part 2.

Why has the IDYLL METHOD been called "the Cartesian Approach to Language Learning" or simply "Cartesian Language Learning"?

In his book "Discourse on Method", the French philosopher René Descartes formulated four principles (including "division of problems"), which have since become (together with Adam Smith's principle of "division of labour") the basis of modern science and technology. All our modern prosperity rests on them.

They are:

1. never to accept anything for true which I did not clearly know to be such; that is to say, carefully to avoid precipitancy and prejudice, and to comprise nothing more in my judgment than what was presented to my mind so clearly and distinctly as to exclude all ground of doubt.
2. to divide each of the difficulties under examination into as many parts as possible, and as might be necessary for its adequate solution.
3. to conduct my thoughts in such order that, by commencing with objects the simplest and easiest to know, I might ascend by little and little, and, as it were, step by step, to the knowledge of the more complex, ...
4. in every case to make enumerations so complete, and reviews so general, that I might be assured that nothing was omitted.

(René Descartes: "Discours de la méthode", 1637. Translated by John Veitch, Everyman's Library, Vol 570, London 1912, Part 2, p 15-16)

In brief:

1. Question all dogmas = Systematic scepticism
2. Divide problems into their components = Division of tasks
3. Solve the problems in ascending order of difficulty = Easy before difficult
4. Make diagrams and enumerations = Diagrams and lists

PRINCIPLE 1

Concerning Principle 1, nobody can credibly claim to be entirely free of prejudice but it can be claimed that the IDYLL METHOD is, often and obviously, less governed by prejudice than some traditional methods, that it tends to be much more rational and analytical, looking at very small components of the learning process and therefore able to re-assemble them differently (synthesis) and come to different conclusions, making things possible which are apparently impossible in less analytical approaches to language learning. The combination of analysis and synthesis is characteristic of the IDYLL METHOD.

PRINCIPLE 2 AND 3

Principle 2 is an outstanding feature of the IDYLL METHOD. It shows itself in the fact that the IDYLL METHOD has special techniques for the learning of vocabulary (words are easier to learn than sentences) and that we learn many words before we practise them in context.

But we go even further and often look at the components of words and help the student to take advantage of such knowledge for faster learning. When learning foreign scripts we even look at the components of characters where convenient.

We make the student **aware** of every detail, to aid initial learning (the very first steps), and then practise in such a way that handling of the language becomes automatic. This distinguishes Cartesian Language Learning from many other methods, including the Direct Method and certain immersion methods of language learning.

Whatever causes difficulties for a student, we spot it, break it down into its components, then learn the components one by one, and then synthesise the components to re-create the whole. The technique of quasi-algorithms (subject-matter algorithms) can be used to identify (diagnose) exactly **where** a student encounters problems. (Bung and Sánchez 1978)

PRINCIPLE 3

Principle 3 is also an unmistakeable feature of the IDYLL METHOD and is applied with more rigour than in many traditional methods. Principle 3 cannot easily be used unless preceded by Principle 2. Therefore approaches which are reluctant to break the subject matter down as much as the IDYLL METHOD does will not be able to achieve the sequence of Principle 3, ascending from easier to more difficult and making things easy enough at the beginning. Bung 1967b and 1973 has shown that tasks cannot be successfully sequenced from easier to more difficult if the analysis of tasks has not been done thoroughly enough, i.e. if a complex task remains unanalysed and contains several components each of which requires different sequencing. This is often the case in traditional language courses.

PRINCIPLE 4

Principle 4: This is used not only by the IDYLL METHOD but also by other good traditional methods, but not by bad ones.

TEACHING ALGORITHMS AND LEARNING ALGORITHMS

An algorithm is a mathematical or computational procedure which is explicit and effective and which, given the same input (starting conditions), always produces the same result, in our case 90% retention of all items which have gone through the procedure (algorithm).

The concept of algorithm (subject matter algorithm) has been introduced into education mainly by the Russian psychologist L N Landa, and the German cybernetician Helmar Frank (computer controlled teaching algorithms). Klaus Bung (1972) introduced subvariables into Frank's model of the didactic variables, and developed the concept and distinction of subject matter algorithm (e.g. grammatical rules), teaching algorithms (specifying the actions of a teacher or a teaching machine/computer) and learning algorithms (specifying the actions of the learner, trying to master the subject matter algorithms).

To keep this exposition simple, we restrict our subject matter to vocabulary. We will later show that our learning algorithms can be used with equal effectiveness for other types of subject matter.

THE IDYLL METHOD

The learning algorithms whose principles I have to describe here form the core of a comprehensive system of language learning known as the IDYLL METHOD. This system prescribes a standard layout for any subject matter to which learning algorithms are to be applied.

Whatever I say here is meant in the strict sense of my words, it is not approximate, it is not in the nature of a recommendation.

The words are divided into exercises of 10 items. The student does not proceed from one exercise to the next unless he has mastered it. Mastery is defined as: the student has given 10 correct answers (responses) in succession, i.e. 100% success.

Before we proceed, let us look at some exercises in popular languages. The student has to learn 10 words by translating them from source language (e.g. English) into target language (e.g. French etc). Further examples with notes can be found in Part 3 of this file.

THE STANDARD FORMAT OF IDYLL EXERCISES

FRENCH

Exercise 1

- 1 the father
 le père (m) /lə pɛ:r/
- 2 the mother
 la mère (f) /la mɛ:r/
- 3 the child
 l'enfant (m or f) /lɑ̃'fɑ̃/
- 4 the man
 l'homme /lɔm/
- 5 the uncle
 l'oncle (m) /'lɔ̃~:klə/
- 6 the aunt
 la tante (f) /la tɑ̃:t/
- 7 my uncle
 mon oncle (m) /mɔ̃~:'nɔ̃~:klə/
- 8 my aunt
 ma tante (f) /ma tɑ̃:t/
- 9 the pen
 la plume (f) /la plym/
- 10 the pen of my aunt, my aunt's pen :-)
 la plume da ma tante /la 'plym də ma 'tɑ̃:t/

Note: The French equivalent of English "la plume da ma tante" is "My tailor is rich. My tailor is not rich" (Mon tailleur est riche). These sentences have become proverbial in France since they were first used as opening sentences of the very popular recorded (8-inch vinyl disks) language course "Assimil Anglais" / "Anglais sans Peine". Among the novels in which they have been quoted is Georges Perec: "La disparicion" (1969).

SPANISH**Exercise 1**

1. the boy
el chico (m) /el 'tʃi:ko/
2. the girl
la chica (f) /la 'tʃi:ka/
3. he speaks
el habla /el 'abla/
4. she speaks
ella habla / 'eʎa 'abla /
5. well
bien /bʲien/
6. He speaks well.
El habla bien. /el 'abla bʲien/
7. Spanish (the language)
el español /el espa'ɲol/
8. He speaks Spanish well.
El habla bien el español. /el 'abla bʲien el espa'ɲol/
9. The girl speaks Spanish well.
La chica habla bien el español. /la 'tʃi:ka 'abla bʲien el espa'ɲol/
10. the teacher
el profesor (m) /el profe'sor/

ITALIAN**Exercise 1**

1. good

buon /bu'ɔn/

Memory aid: bonus, bona fide

2. the day

il giorno (m) /il 'ɔrno/

Memory aid: journal

3. Good morning (literally "Good day")

Buon giorno /bu'ɔn 'ɔrno/

4. the evening

la sera (f) /la 'se:ra/

Memory aid: serenade

5. Good evening

Buona sera /bu'ɔna 'se:ra/

6. the night

la notte (f) /la 'not-te/

Memory aid: nocturnal

7. Good night

Buona notte /bu'ɔna 'not-te/

8. Thank you

Grazie /'gra:tsie/

Memory aid: gratitude, grateful

9. etc

GERMAN**Exercise 1**

1. 1 the crocodile
das Krokodil
2. swims
schwimmt
3. in the Nile
im Nil
4. The crocodile swims in the Nile.
Das Krokodil schwimmt im Nil.
5. the river Rhine
der Rhein
6. in the Rhine
im Rhein
7. the pig, the swine
das Schwein
8. The pig swims in the Rhine.
Das Schwein schwimmt im Rhein.
9. the fish
der Fisch
10. the water
das Wasser

Exercise 2

1. 1 drinks
trinkt
2. The fish drinks water.
Der Fisch trinkt Wasser.
3. the wine
der Wein
4. the woman
die Frau
5. The woman drinks wine.
Die Frau trinkt Wein.
6. the beer
das Bier
7. the man
der Mann
8. The man drinks beer.
Der Mann trinkt Bier.
9. blue
blau
10. The woman is blue.
Die Frau ist blau.

Note: "Die Frau ist blau" can also mean "The woman is drunk".

ABSURD SENTENCES

Absurd sentences can be very useful. Not only for learning vocabulary but also for learning grammar. They are often more memorable than "reasonable" sentences. If you learn to form correct sentences about rabbits conducting a motor cycle race in the coffee cup (an idea I owe to an excellent American programmed Spanish course; Grolier), or impatient snails queuing and blaspheming at the ATM machine, you have learnt something memorable and you can easily adjust it to human beings queuing or swearing. We should not be obsessed with the immediate usefulness of the sentences we practise. Such usefulness is necessary and justified in a phrase book for tourists, but not in a language course, whose purpose it is to teach language and not ready-made sentences to be used in popular situations. I have been to language courses which avoided grammar and systematicity and focussed on "useful" sentences to such an extent that they became courses in sentence learning (much as vocabulary learning in the olden days but much more difficult). Some of the best and most useful textbooks on my bookshelves, some very old, are comprehensive and leisurely, teach the principles of the language and train the student to adapt these to any concrete situations that might arise. **Absurd examples** for vocabulary and grammar can be beneficially used for similar purposes.

URDU**Exercise 1**

1. rice
'tʃa:val (m)
2. white
sa'fe:d
3. coal
koi'la: (m)
4. black
'ka:la
5. blood
xu:n
6. red
surx
7. banana
'ke:la: (m)
8. yellow
zard
9. grass
g^ha:s (f)
10. green
sabz

Note: In this vocabulary exercise, we are pairing primary colours with typical objects to stimulate and utilise visual imagination.

ARABIC

In the Arabic example, the student translates English words into Arabic and learns writing them in IPA and in Arabic script. In the second example, he is given the Arabic letter names in IPA and converts them into Arabic script. Usually the student will have handwritten exercises in front of him which he has written out himself, a preliminary stage of learning.

Ex 4	Ex 7	
1 sheep	1 si:n	6 za short vowel emphatic
xa'ru:f ف	س	ظ
2 bread	2 ji:n	7 ʔain
'xakaz	ش	ع
3 bear (animal)	3 sa:d emphatic	8 yain
dib	ص	غ
4 cock (animal)	4 da:d "	9 fa:
di:k	ض	ف
5 corn cob, maize	5 ta short vowel "	10 qai:f
'du:ra	ط	ق

The student never spends time just looking at text (or mumbling words, or mentally "concentrating on them") in order to learn them but is always active trying to answer one question after another always in writing, an observable activity, which can be subdivided, when required, into the skill of writing each letter. In our first example, the student translates words from English into French, or whatever language). He is "doing one item after another." He covers the model answer with a slip of folded paper, writes his own response on this paper, and pulls it down to reveal the correct answer. He determines whether his answer was right or wrong.

On the basis of this evaluation PAPA (the Pen And Paper Algorithm) knows approximately the retention time the student has achieved. IDYLL tests not only correctness but also retention time. A correct response after 20 seconds is treated differently from a correct response after 15 minutes, 2 days, or after 4 months.

WHY IS PAPA A "DYNAMIC" LEARNING ALGORITHM?

PAPA determines in which sequence the items have to be tackled (i.e. how much time in seconds, minutes, days, or months, has to elapse between each revision of the same item). Times are approximate but determined by precise rules.

If the student gives a correct answer after x time, PAPA increases the interval before the next revision. If the student gives a wrong answer after x time, PAPA decreases the interval, and continues doing so until the student begins to give correct answers. Such algorithms are called adaptive because they respond to the student's behaviour. The system is called "dynamic" because the intervals are continuously changing, up or down, like a thermostat.

The intervals are controlled at the macro-level with the help of a revision diary which determines the intervals between learning sessions in terms of days, weeks and months, increasing or decreasing them as required.

The intervals are controlled at the micro-level within one learning session (duration of 30 to 60 minutes), in terms of seconds and minutes (varying from, say, 20 seconds to 3 minutes, the time it takes to do one run through an exercise). This is done through a decision mechanism (learnt by the student as part of his training in using the IDYLL METHOD) which determines, on the basis of the learner's correct or incorrect responses, which item is to be tackled next, i.e. in which sequence the items are to be tackled. These sequencing decisions automatically determine the timing (revision intervals).

The initial objective of PAPA is to achieve a retention of, say, 20 seconds for one item, which is like putting a car into first gear. In other words, PAPA attempts to get a correct response 20 seconds after the learner has last seen and copied the correct answer. PAPA then tries to stretch this retention time to, say 3 minutes, 15 minutes, 1 hour, 24 hours, etc, to 4 months. This is like putting a car gradually from first gear into fifth gear.

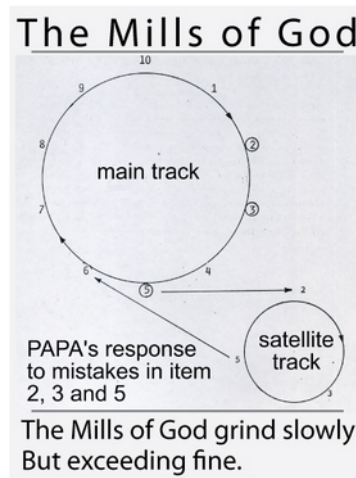
VARIANTS OF PAPA

There are three variants of this algorithm, PAPA-BASIC, PAPA-INTERMEDIATE and PAPA-PREFERRED.

PAPA-BASIC is the easiest to learn but less efficient. PAPA-PREFERRED is more difficult to learn but extremely efficient. PAPA-INTERMEDIATE is a compromise between ease of acquisition and efficiency.

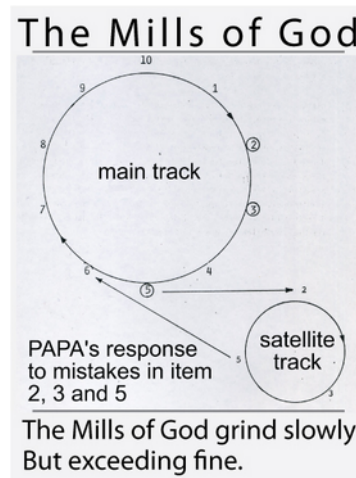
It always pays to let students learn PAPA-PREFERRED. But it is good policy to teach them PAPA-BASIC and PAPA-INTERMEDIATE as an introduction to the IDYLL METHOD (the micro level), then teach

them REV, the revision algorithm, which stretches the retention time from 24 hours to 4 months, and ENFA, the Enforcer Algorithm, which deals with items which are trying to slip through the net, i.e. which one particular learner finds extraordinarily difficult. There are precise rules for dealing with such items (e.g. words or grammatical forms). Recalcitrant items are so ground down by the Enforcer Algorithm, that eventually these difficult items are the easiest, the tamest, and eat out of the learner's hand. It is impossible for a difficult word, or form or rule to resist extraordinary rendition. As an ancient Indian text says: "On this path no effort is ever lost and no obstacle prevails" (Gita 2:40). This promise applies to our language learner too and it gives him confidence.

PAPA-BASIC VS. PAPA-PREFERRED

PAPA-BASIC is simple: The learner tackles one item after another, from 1 to 10, and again from 1 to 10, until he has made 10 correct responses in succession. You can imagine the items as numbers 1 to 10 on a circular track. The learner keeps going round and round practising until he has mastered the exercise.

PAPA-BASIC is an algorithm, but not a dynamic one; it does not adapt to the learner's performance. It uses only the "main track" (which accommodates 10 items). Once the student has mastered an exercise through PAPA-BASIC, this exercise is passed to REV, the retention algorithm, which is adaptive, and is easy to learn.



PAPA-PREFERRED is dynamic and controls the learner's behaviour at the micro-level, i.e. within one learning session. The goal is the same as that of PAPA-BASIC, namely to obtain 10 correct responses in succession from the student, i.e. to get the student to exhibit a retention time from between 1 and 3 minutes. But PAPA-PREFERRED achieves this in a more sophisticated way (and more quickly) than PAPA-BASIC.

In this Part of the book, I will describe only the principles of PAPA and not the technicalities. Learners have to understand, and be in sympathy with, the principles. Otherwise the technicalities will appear tedious, and the learners will not follow the very precise instructions of the algorithm.

Any deviation, however small, from the literal application of the algorithm will destroy its effectiveness, which has been tested over and over again, and cannot be improved at the whim of a teacher or a learner who have only a partial understanding of the system as a whole. Deviations which appear trivial to the learner can be fatal for the algorithm, which depends on all its components being exactly where they are expected. Analogy: two trapeze artistes. Each of them depends on the other being exactly where he is expected. If one partner varies his position even slightly, the other one can fall to his death, no matter how good an artiste he may be himself.

PAPA-PREFERRED is very much an exemplification of the Cartesian principle that problems have to be divided into manageable chunks. The IDYLL METHOD says in addition that no task is so easy that it cannot be made even easier (by further division) if a learner requires it (i.e. "no obstacle prevails").

PRINCIPLES OF PAPA-PREFERRED: DIVIDE AND RULE

The task in front of the learner is not to learn French, German, Spanish, Latin, Greek, Sanskrit, Arabic, Chinese, or whatever, but to learn ten words. That is manageable.

On the main track, PAPA-PREFERRED looks for three words which the learner does not know (i.e. gives wrong responses to). These three words are then placed (by the system) on the satellite track.

Physically they stay in the IDYLL Workbook (aka **Catechism**) (see image above, handwritten Arabic example, and handwritten examples in Part 3). The task at hand has now been reduced from 10 items to 3 items, from the main track (testing track) to the satellite track (intensive track). Psychologically the student can relax. He may be phased by the task of learning 10 words, but not by the prospect of having to learn 3 words. (Removing stress is an essential part of the IDYLL METHOD and helps to make it so effective.)

Even better: The student's task is not to learn all three items. All he is expected to do is to give one correct response, to remember just one of these items, any item, for just 20 seconds. No student can say that this is too difficult, especially as he can go round the satellite track at leisure and as often as he likes.

If the three items on the satellite track are 2, 3 and 5, the student tries 2, 3, 5, 2, 3, 5 etc etc, until he has given one correct response, which proves a retention time of, say, 20 seconds or less for that item. There are now only 2 items on the satellite track (and a record of them is kept there). PAPA-PREFERRED therefore sends the student back from the satellite track to the main track. The student continues working his way around the main track and tries to find another unknown item (item with an incorrect response). The student is happy when he makes a mistake because this is his entry ticket for the nice and leisurely satellite track. He knows that the satellite track is his short-cut to success. O felix culpa! As soon as the student has a total of three incorrect items (e.g. two still remaining on the satellite track from his last visit there, plus the one just found on the main track, testing track), he returns to the satellite track and tries to eliminate one of the three items, a stress-free but very effective task.

This dynamic interaction between the main track and the satellite track is continued until the student has reached his objective for this learning session: 10 items correct in succession. This means that for each item in the exercise a retention span of, say, 3 minutes (i.e. the duration of doing the whole exercise once while giving only correct responses) has been demonstrated. You might call this "second gear" when driving a car.

PAPA-PREFERRED (interaction of main track and satellite track) and the objective of mastery (10 items correct in succession) applies not only to initial learning but also to each revision.

In the IDYLL METHOD there is no difference between learning and testing. Every learning session has the form of a test: questions and answers which gradually move up from guessing to unshakeable knowledge. This reduces tension and ensures that the algorithm continuously monitors the learning activities of the student. It also ensures that the student does not spend a minute more on "learning" (whatever that might be) than is absolutely necessary. The moment he passes one of his continuous "tests", he can stop work or move on to the next exercise (= test).

The learner's first round on the main track is a sequence of guesses with a, say, 2% probability of success. This probability increases with each round of the guessing game until the learner has learnt to guess the answers of one exercise with a 90% probability of success. If the student is dead-sure about one item (e.g. English "house" = German "Haus"), then we say that he can guess the answer with a 99% probability of success. Whatever answers we give in life, even from profound "knowledge", our answers are always guesses - with varying probabilities, and never quite 100%. The sun will probably rise again tomorrow morning, but even James Naughtie, the Pope, or Great Homer may just very occasionally slip up. Learning can therefore be seen as systematically increasing the probability of correct guesses. The IDYLL METHOD recognises this, and the student can relax (very important!). All he is expected to do is to guess - no guilt is involved. Initially he guesses largely wrong, eventually he guesses right. The algorithms lead him from darkness to light, from weak guessing to good guessing, from diffident guessing to confident guessing.

There is also no difference between the rules which apply to initial learning or to revisions (after days, weeks or months): The same learning algorithm is used (PAPA), the target standard (mastery = 100% correct answers in succession) for the revision is the same. The student continues with the exercise until he has "mastered" it. The expectation is also the same: 90% retention on average. Each item that has failed (when the revision intervals have reached a specific point: R4 is copied into ERB (the Extraordinary Rendition Book), which causes 8 additional revisions distributed over eight months (but no howling and gnashing of teeth). Here again our motto "And no obstacle prevails" applies.

Because of Extraordinary Rendition, it cannot happen that the 1-item per exercise failure rate (forgetting) which the system permits gradually builds up a large collection of unknown items.

Learning is obviously much more fun

- if the student experiences almost nothing but success,
- if he feels in full control of the subject he is studying,
- if he can walk full of confidence into any exam at any time, without special revision just before the exam,
- and if, moreover, learning itself is so extraordinarily easy.

IDYLL provides all that.

From the bird's eye perspective, what is happening is that the algorithms are looking for "easy meat", for soft targets, items which are easy to learn, and get them out of the way. Over a period of about nine months a residue of obstinate items (refusing to be remembered) is filtered out and subjected to ever increasing pressure to submit (to be learnt). The more obstinate the item, the greater the pressure. There is no point in applying this pressure, these extraordinary techniques, to soft targets which do not require them. Since no item is ever allowed to escape for good (call it the Inspecteur Javert syndrome [Les Misérables]), this happens not only in the short-term, hours and days, but also in the long-term, after an interval of many months.

PROVISION FOR SPECIAL LEARNER TYPES

It is one of the outstanding features of the IDYLL METHOD that it provides not only different routes to the objective for different learners, the most efficient route for each learner, and that it also provides precise instructions for learners who fall by the wayside and tells them how to get back on the rails in the most efficient way (e.g. students who have missed a few revisions, or several months or years of revision, because of illness, change of occupation, etc).

The method has been designed to have general applicability, not to work only in one specific case and context, but in all cases, with teacher, or without teacher, for advanced students or beginners, for gifted students and for slow learners, etc etc, and all this with the simplest possible rules.

I will mention here only the provisions for altering the size of the main track and the satellite track. When my experiments with PAPA first started, ages ago at Arizona State University, the large track contained 30 items, i.e. proof of mastery was "30 items correct in succession", which meant that the retention span achieved during initial learning was very long but also very difficult to reach. Students often had to do 30 items again because of only 1 mistake. This had certain advantages but the

current version, of a 10-item main track with a 3-item satellite, has proved most effective over the years - for normal language pairs and for normal learners. So that is the standard, but we deviate from it when we have good reason.

The 10-item main track is accompanied by the 3-item satellite. The size of these tracks can be adjusted to suit certain learners or certain language gaps.

ADJUSTMENTS FOR DIFFICULT LANGUAGES

Language gaps: If L1 (source language) and L2 (target language) (e.g. English and Spanish) are closely related, there is a small language gap and L2 can be said to be easy, or "normal". The values 10 and 3 for the main track and the satellite track respectively have been tested for a normal language gap.

Sanskrit, Hindi, Urdu and other Indo-Arian languages are comparatively distant from English and therefore may be treated as "difficult" languages. When dealing with difficult languages, we change the values of the tracks: main track = 5 items, satellite track = 2 items. PAPA rules remain unchanged (except that these two constants are altered). The effect of reduced values are that there are more intermediate steps before full mastery on the 10-item track is achieved. The intervals between revisions become shorter, and initial retention becomes easier and therefore faster.

The standard exercise is divided into two halves, 1-5 and 6-10. The student continues working through 1 to 5 until he has achieved mastery. He slips into the satellite track as soon as he has found two unknown items (2 mistakes). Once 1 to 5 has been mastered, the learner tackles 6 to 10 in the same way. THEN he tackles 1 to 10 in the "normal mode" (track size of 10 and 3). This is like helping someone, e.g. an apprentice burglar, to mount a wall by putting many small steps in front of it, but eventually the apprentice, if he wants to be recognised as a master burglar, has to jump over the wall without these helping steps.

The situation will be different for a speaker of Hindi (native speaker, or someone who has already learnt Hindi well). For him Sanskrit will be "normal" and track size 10 and 3 will apply from the beginning. Similarly Latin will be "normal" (easy) for a speaker of Italian or vice versa.

ADJUSTMENTS FOR SLOW LEARNERS

The same adjustment can be made to help people who, for whatever reason, find learning a so-called "easy/normal" language difficult. Let's call them "slow learners". If such a learner finds normal track size (10 and 3) frustrating, he can switch to track size 5 and 2.

For most English learners, Spanish will be normal (easy). Most Spanish learners will find Italian normal/easy. But if any such learner has difficulty with the normal track sizes, he can switch to the easy (smaller) track sizes. In brief: slow learners or "difficult" languages are treated in the same way.

This facility is extremely useful for failing schools, or schools classified as failing in modern foreign languages.

ADJUSTMENTS FOR FAST LEARNERS AND FAST FORGETTERS

On the other hand, there are certain learners who are fast learners and fast forgetters. I have had such people in my courses on the IDYLL METHOD. Some computer programmers were of that type. They were very fast in achieving mastery in initial learning. But an hour later they would have forgotten what they had learnt, whereas more normal learners would remember the predicted 90% or more after one hour.

The fast learners might be given an exercise with 10 unknown items, go round the main track once, and in the second pass get every item correct, whereas a normal learner might have to go 5 or 8 times round the main track before achieving mastery.

An hour later though, the normal learner will remember 90%, whereas the fast learner (e.g. computer programmer) will remember only 50%, which in the IDYLL METHOD is quite unacceptable. Such learners have to be forced to do more repetitions (especially of "known" items) on the main track before mastery can be declared.

The PAPA rules are so designed that the few obstinate items in an exercise force the student to practise also the known items, thus ensuring that they are better anchored in his memory. (This is sometimes called "overlearning", a rather misleading and woolly term. In the IDYLL METHOD there is no OVERlearning but only the correct amount of revision to achieve the objective.)

Before we release the fast learner (e.g. that notorious computer programmer) from the main track, he has to demonstrate twice the normal retention span for all items, i.e. when the duration of the main track is, say, 5 minutes, the normal learner who gives 10 correct responses in succession provides evidence of 5 minutes retention of each item.

To ensure that the fast learner (computer programmer) does well during the later revisions, we must force him to demonstrate a longer retention span than the normal learner. We achieve this by doubling the size of the main track. The size of the satellite track remains unchanged. So for the computer programmer the track sizes are: main track = 20, satellite track = 3.

The fast learner will combine two 10-item exercises to get one 20-item exercise, e.g. Exercise 10 and 11 will be combined. The procedure is then as follows:

- Mastery of Exercise 10 (This means that the main track size is, at this stage, normal: 10 and 3)
- Ditto Exercise 11
- Then Exercise 10 and 11 in succession (This increases the main track size to 20, with size 3 for the satellite track).

Mastery can be claimed only when the student can make 20 correct responses in succession. If he makes one single mistake, however small, he has to go through the whole track again. This can happen repeatedly, just because of one mistake, and perhaps each time in a different item because of lack of concentration. etc. This ensures that the fast-learner cum fast-forgetter gets the number of revisions of all items that are required for long-term retention.

ALGORITHMS ELIMINATE DESIRE, FEAR AND ANGER

The objectivity of the learning algorithms helps to remove the three great enemies of successful language learning: desire (greed), fear and anger.

Desire causes the learner to want to progress too fast (unrealistic expectations). He will then be frustrated and disappointed when he cannot learn and remember at that speed. Analogy: If a train journey in India takes 38 hours, that's what it takes. I will not fret but will take enough food and water and learn Hindi so that I can enjoy the company of the other passengers. I cannot change the railway timetable (corresponding to the laws of human memory): I must adjust my behaviour to it.

Desire also causes the teacher (often constrained by an unrealistic syllabus) to force a class through a course, thinking he has done his duty if he has "covered" (presented) the subject, even if the students have not learnt it. The algorithms represent an immutable railway time table. Like it or not, you can not learn faster than what the algorithms say. You can only pretend to be learning, as many students do. The speed of light, for example, is an absolute. You can not beat it, therefore you should not desire to do so.

Fear causes the learners to expect failure, not to trust in their own learning skills, wasting energy on repeating "I cannot do it". These fears tend to be self-fulfilling. The algorithms set

the student a simple goal, which he knows he can achieve, namely to answer correctly just one question on the satellite track. He need not worry: "What comes after that, and what after that". He needs to learn only one word, and can trust that the algorithm will tell him, unambiguously, what to do next. (Even when the student has missed out on some revisions, the algorithm prescribes the optimal remedy.). The student can focus on that one word. Concerning the other words he can say: "We will cross that bridge when we come to it, the algorithm will take me across that river, or even that ocean". He can trust the algorithm like a child can trust his parents. Working with the algorithms has something of the calming effect of meditation exercises. The student is concerned only with the here and now. His task is not even to write one word, his task is only to write the next letter. Fear will cause him to worry about the future, and whether he will perform well. The algorithm removes this fear by letting him do only one thing at a time.

This total absorption into his work is more easily achieved if the student uses pen and paper rather than a computer when doing his IDYLL exercises.

Anger is a most dangerous emotion for adult language learners. Instead of following the simple instructions of the algorithm in case of a mistake (write down the number of the mistake, cross out the error, copy the correct answer, move on to the next item), many, if not most, untrained students respond to a mistake by passing judgment on themselves or on the system: "Your system does not work. You see I told you I can remember nothing, I am bad at language learning. This language is impossibly difficult." They are reflecting on their failures (wasting time and energy). I never promised these students that they would not make mistakes. What I promised was that I would diagnose their weaknesses and eliminate them. IDYLL welcomes mistakes. It means that they can be eradicated. Mistakes are a symptom of ignorance. Even if the mistakes are not made (e.g. because a question is not posed, or because of cheating), the ignorance is still there. If I make a mistake, I am happy since the mistake diagnoses a weakness. Mistakes are the rungs on the ladder to success. Once I can get a student to trust in the algorithm, his anger will disappear and he will gain at least 30% in his learning efficiency.

As part of the system, the student will become aware that cheating is not a clever thing that harms the teacher or examiner, but that cheating is something bad that he does to himself. If he cheats, he shoots himself into his own foot because he will not then learn. By thrusting the responsibility for progress and learning on the student, away from the teacher, the student becomes aware that the purpose of learning is not to get certain grades or to please or benefit the teacher, but that the purpose of learning is to acquire skills. Learning does not benefit the teacher but the student. Therefore there is no point in either sabotaging the teacher or in cheating and pretending to the teacher that the student knows more than he actually does.

The goal of learning is knowledge (and skill), not evidence (or semblance) of knowledge and skill.

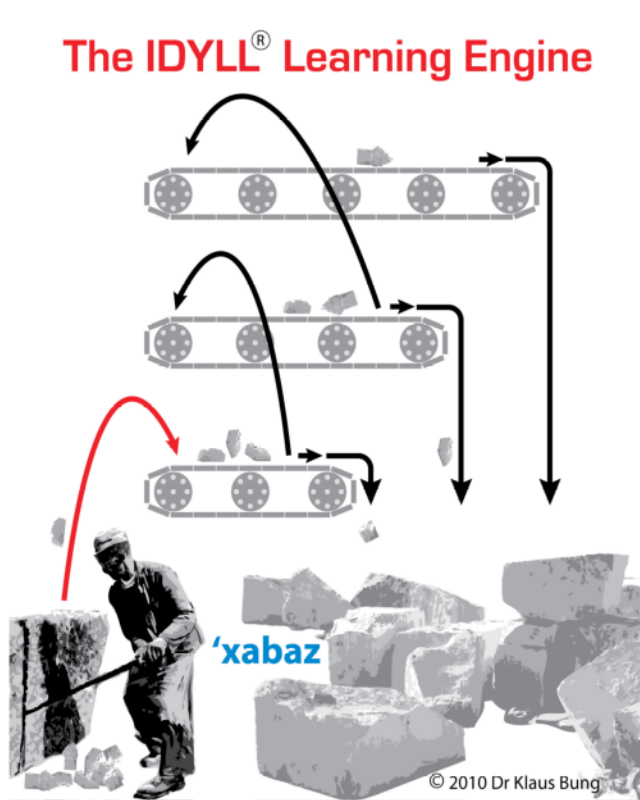
SILLY ADVICE OFTEN GIVEN TO LANGUAGE LEARNERS

Books on study methods often refer to the concepts of long-term and short-term memory. These concepts are so coarse that they cannot help learners in the slightest. There is no such thing as a short-term or long-term memory. Any dividing line is arbitrary. No useful learning advice can be based on such concepts. The IDYLL METHOD by contrast is based on a more realistic and useful memory model which assumes infinitely many memory layers, each of which associated with a different retention time. (Bung 1991a). The Memo-Sutras contained in Bung 1991a state succinctly the assumptions of that model, and all practical consequences can be derived from it, for example the algorithms presented in this book, the ideal revision times, and how to learn more by revising as little as possible.

It is the task of the learner to heave each item first into a memory layer with a short retention span (e.g. 20 seconds) and then do each subsequent revision at a time when it maximises the increase of memory span (jump from one memory layer to another). This will make the time taken for each revision as short as possible and enable the student to revise as seldom as possible.

We do this by revising as late as possible (i.e. make fewer revisions) **AND** as early as necessary to avoid forgetting. For this purpose, the ideal time for revision is just before the projected time of forgetting (which is computed by the IDYLL algorithms at the level of 90% retention), i.e. we revise when we expect that the learner still remembers 90%. If we revise too late, the student will forget too much (make more than 10% mistakes), if we revise too early, the student will have wasted time and the jump to a deeper memory layer will be smaller (i.e. increase in retention span will be smaller). The revisions must take place when there is at least a CHANCE of making a mistake, but only a 10% chance. Even mistakes have a right to exist: we welcome them - in moderate numbers, in the right proportion. Like immigrants, they are the spice of life. The IDYLL revisions therefore must take place very close to the abyss of forgetting - as close as possible but not too close. In the words of an ancient Indian sage: "This is a path most difficult to tread, sharp like a razor's edge" (Katha Upanishad 1:3:14).

The memory layers we have been talking about do, of course, not physically exist but are only a model based on our observations of the functions of remembering and forgetting. Another model, more concrete and less likely to cause confusion between model and physical reality, is a system of conveyor belts.



Men work in a quarry to break up huge blocks of stone into manageable sizes. This work, which is not algorithmic, neither in the quarry nor in the study, has close analogies to the early tasks in language learning, which has to be done by the teacher (or textbook author), or by the student himself if teachers and authors have not done an adequate job. Details of this work have been, or will be, discussed elsewhere.

Initial learning corresponds to the act of lifting the stones onto the lowest conveyor belt. Each revision lifts the stones from one conveyor belt to the next higher one, with a longer "running time", i.e. the distance between the required revisions increases. Any student of yours can easily see that. If the student is not in position at the end of each conveyor belt to move the stones to the next belt, the stone will drop back into the quarry and the whole process has to start again, a silly and completely avoidable waste of time, and also frustrating and demotivating. But this is what most language learners do and what most language teachers do not prevent. No wonder that language learning is unpopular and considered difficult. The IDYLL algorithms predict when each stone is about to reach the end of its belt and has to be lifted to the next.

The endlessly repeated advice from teachers to their students: "Revise as often as possible" is silly nonsense. It guarantees failure: No student working on this basis will make the number of revisions necessary for him to be successful. The IDYLL METHOD proclaims instead: "Revise as seldom as possible, but as often as

necessary", and our algorithms tell the student WHEN it is necessary.

An attitude that prevails in schools is: "We have to revise because you have forgotten". This is also stupid and wasteful. The IDYLL METHOD says: "You have to revise before you forget, and in order not to forget". If a student follows the IDYLL maxim, each revision will give him a feeling of triumph ("Yes, it is true, I can remember everything, I am a good student, language learning is fun"), rather than of regular frustration as in most schools. He will therefore want to study more and do his revisions on time.

Parents trained in the IDYLL METHOD can help to encourage this and ensure that the student follows the absolutely vital revision schedule. Pupils, parents and teachers have to work together. Each makes an important contribution to the ultimate success.

The revisions before forgetting take only a few minutes whereas revisions after forgetting take many times more time than the IDYLL revisions.

SUBJECTS TO WHICH IDYLL LEARNING ALGORITHMS CAN BE APPLIED

Our learning algorithms can be applied to any language, to the learning of vocabulary, sentence fragments, sample sentences etc. Some examples have been given above. Many more examples can be found in Part 3.

IDYLL can also be used for the teaching of foreign scripts. Greek and Russian scripts are too easy and too similar to Latin to require algorithmic treatment, but Sanskrit and other Indian scripts (North and South) and Arabic (and related scripts) can benefit from this approach.

Factual information can benefit from the same approach, both during initial learning and during the revision period. Anything that can be turned into a quiz (presented as stimulus and response) can benefit and ensure that the student walks full of confidence into his exam. Joining separate words in accordance with sandhi rules is an obvious candidate for algorithmic learning, from the first introduction of these rules, up to the ultimate stages when the student has to get them right even in random order. ("No obstacle prevails", if the student applies these methods.)

Subject-matter algorithms are fool-proof procedures which enable a student (or a computer) to convert any given input efficiently and without error into a wanted output. The sandhi rules are obvious candidates for converting from their usual prose or tabular form into subject matter algorithms (Bung and Sánchez 1978). To internalise this procedure, the student is given a large number of examples for each rule. The examples (questions and answers) are written down in the IDYLL format. The student

then practises the exercises in accordance with PAPA, works out the solution for each item by referring to his chart (the subject matter algorithm). He continues doing this, again and again, until he gradually becomes bored with referring to his chart (flow diagram) because he can see the correct answer at a glance and is absolutely sure of it. (Bung 1972, Landa 1968 and 1969)

THE IDYLL ALGORITHMS WORK WELL IN CONJUNCTION WITH VERY DIFFERENT TEACHING METHODS

The IDYLL METHOD is a comprehensive system for language learning and has a preferred answer or solution for almost any problem or task that can arise. However, not all its components are core components. Some components are recommendations or preferences rather than strict rules. These non-algorithmic components of the IDYLL METHOD are described in **Part 2 of this book**.

Part 1 deals only with the algorithms. The algorithms themselves are strict and cannot be altered without damaging the system, but they can be combined with almost any existing textbook, course material or approach for the teaching of any language, and make such courses more efficient. It does not matter whether your basic textbook is old-fashioned, or modern, in what sequence the various elements of your language are tackled (even though IDYLL is very much concerned with programming the best sequences of language elements and has strong preferences in this respect). For all these approaches, PAPA, LASPEX, REV and ENFA can be used to make them more efficient. The algorithms are flexible in this respect. Like any MP3 player which will play any MP3 file, regardless of its contents, The IDYLL learning algorithms will process any material which has been converted into a question and answer format ("quiz") and laid out in the IDYLL standard format.

The subject matter can be converted into the IDYLL format by the teacher or by the student. If it is done by the teacher, there will be fewer mistakes and, once the material has been prepared, many generations of students can benefit from the same materials. If it is done by the students, each student has to do the "quarry work" (see diagram above), year after year, again and again, and some mistakes will inevitably get into the exercises (unless the teacher checks them), but preparing the exercises, bringing the subject matter into the IDYLL format is useful. It is the first stage of learning for the student, and speeds up initial learning when it starts.

THE IMPORTANCE OF TRAINING

Even if you do not run courses on the IDYLL METHOD for your students, I recommend that you refer them to the website (click: Practical Advice, especially PAPA-BASIC and PAPA) and let them pick out whatever information they want. All the information is free, and is as clear and detailed as I have been able to make it so far. I will continue to improve it.

The only drawback with students relying on the website without attending a seminar or workshop is that they often do not see how stringent the rules are and pick out just a few ideas (with the result that they benefit only 10% when they could benefit 100%) and do not experience even remotely the power of the method, provided it is used exactly.

They will not experience the 90% retention because they do not think that it is possible, and they do not appreciate that adherence to the rules is necessary. My greatest problem with learners (and nowadays I have many of these on the Internet, especially from the Indian subcontinent and from Arab countries) is that, at a distance, I cannot easily induce them to read my articles properly and fully and then to put into practice what they have learnt. They are grateful and think they have benefited but I know very well that they have not benefited as much as they could have done. That's why it is in the interest of students to be trained by an expert who fully understands the system.

TRAINING TEACHERS

Training teachers in the IDYLL METHOD is useful because, if teachers organise their material, handouts and home work in a way that is more closely in keeping with the IDYLL principles, it will become easier to digest and assimilate by their students. The students have to do less "quarry work" and can devote more time to learning and produce better homework. Moreover preparatory work done by teachers (e.g. preparing homework in the IDYLL format) can be reused year after year. This therefore means less work and more success for the teachers in the long run.

TRAINING PARENTS

It is also useful to train willing parents together with their children. This will enable the parents to help if a pupil has forgotten or misunderstood one of the IDYLL rules, or wants to shoot himself in the foot by cheating on the IDYLL rules. They can keep emphasising to the child the benefits of strict adherence to the rules. Moreover, all members of a family (even at university level) can benefit from such parental training at the school of one child, whatever subject and language they are learning. In brief, training the parents will have great benefits for everybody, the children will learn better, the teachers will have more motivated and successful students and teach better, and the schools will gain in standing and reputation.

TRAINING STUDENTS

Even training only some students is helpful. If they apply the IDYLL METHOD at home, even in an unchanged school environment, they will soon be able to provide some pleasant surprises to their teachers and the rest of their class. But, obviously, ideally all three parties, students, teachers and parents should be trained.

^==== PART 1: WHY IT WORKS: THE THEORY ==== ENDS

^==== PART 2 ==== STARTS

The IDYLL METHOD

Part 2: How to work it: The technical details

PART 2: HOW TO WORK IT: THE TECHNICAL DETAILS

INTRODUCTION TO PART 2

The IDYLL METHOD is a learning system which helps motivated adults to learn any foreign language, enjoy their studies, and remember 90% for as long as it is useful. It has been thoroughly researched, and its core principles have been described in Bung 1991a. The chain of all relevant publications by Klaus Bung and other authors can be traced back from there. The present document is an attempt

- to describe all the essential techniques of the method in a single document
- show how they are interrelated,
- unify the terminology which has developed over the years,
- and describe the technical details ("How to do xyz", rather than "Why the IDYLL METHOD is good") in terms addressed to the end-user, the ordinary language learner rather than the academic or teacher, as has been done in previous publications.

Part 2 therefore contains mainly "How to" information and less "Why" information, less justification and persuasion. The most up-to-date "Why" information can at present be found in Part 1 and on the website. Whereas Part 1 deals mainly with language elements (vocabulary, grammar, sentence fragments, idioms), Part 2 also covers, in outline, techniques closely linked to communication skills.

The IDYLL philosophy assumes that what (and how much) the student does between lessons is more important than what happens during lessons and that a student can and should use the IDYLL METHOD to compensate for any shortcomings of his teacher. The IDYLL METHOD can therefore be combined with, and enhance, any teaching method, however ignorant it may be of the IDYLL approach.

Students who use the IDYLL METHOD secretly can provide their teachers with pleasant surprises. However, students can be greatly aided if teachers hand out learning aids in the standard IDYLL format rather than leaving it to each student to construct these for himself.

Teachers can therefore benefit from being trained in the IDYLL METHOD, even though the method is a LEARNING method and not a teaching method, a method which shifts the responsibility of success from the teacher to the learner. It therefore presupposes willing learners and learners who can be motivated by success in the language (internal motivation) rather than relying on motivational gimmicks, which the IDYLL METHOD studiously avoids.

The IDYLL METHOD teaches each student how to control his learning behaviour at the micro-level (in terms of seconds and minutes) and at the macro-level (in terms of hours, days, weeks and months). It allows him to proceed at his own pace, generate exactly the number of revisions he needs, exactly when he needs them. It also allows him to benefit from the sadly neglected Skinnerian principle of immediate feedback of results. (Lumsdaine and Glaser 1960)

Allegedly weak students (and underperforming schools) can benefit conspicuously from this approach.

This amount of individualisation can obviously not be controlled by a teacher. Every student has to control it for himself. The method therefore presupposes that the student **WANTS** to learn. The successes of the method, however, are so stunning that most students WILL WANT to learn once they have experienced it for themselves.

Obviously it is in the interest of a school to have students who WANT to learn rather than students who **RESIST** learning. Students who want to learn use the teacher as a resource (as an informant, who tells them WHAT to learn) and use the IDYLL METHOD to absorb the language elements they have been given (in class and especially between lessons). They use the class mainly to practise the communication skills under the guidance of the teacher. The language elements which they absorb with the IDYLL METHOD prepare them for efficient, successful and enjoyable practice of communication skills.

The IDYLL METHOD is successful even in the worst of circumstances (enabling the student to learn from even the worst teacher and efficiently absorb whatever is thrown at him by the teacher, e.g. too fast or in too condensed a form). This requires a student who **WANTS** to learn, who is active in himself, does more than the teacher demands, does not merely want to get by but wants to be best, does not only want to dutifully hand in his homework but wants to have mastered it in every detail, does not need to be dragged along by the teacher but, on the contrary, is eagerly trying to get more language information (input) from the teacher.

By being able to demonstrate and ensure success, the IDYLL METHOD helps to create such students, this spirit of WANTING to learn.

But if the teacher is a good teacher, prepares, explains and practises his subject matter well, has been trained in the IDYLL METHOD and provides all his students with ready-made exercises in the IDYLL format (which can be re-used year after year), then we have the desirable situation, of both parties, teacher and learner, fully co-operating.

The situation becomes ideal if the parents have also been trained in the IDYLL METHOD so that they can help and encourage their children.

A highly successful computer-based course was published in Germany some years ago (Beginners' English for speakers of German, Bung 1991b), but we feel that concentration and absorption is even greater if people work with the more intimate tools of pencil and paper.

This also makes the method independent of expensive hardware and electricity (benefit for developing countries, rural communities, holidays, travel) and relieves the problems (and waste of learning time) if students or teachers struggle with typing "exotic" scripts, say Arabic, Urdu, Hebrew, Devanagari, Tamil, where the implementation may be different on each computer.

It enables the learner to squeeze in 15 minutes of learning time wherever he is, at a motorway service station, while in a waiting room, waiting for a train, etc. The learner should always carry his little IDYLL workbook with him. This is not possible even with a laptop.

Study of this document will reveal that the IDYLL METHOD is effective not only in the learning of foreign languages but also of many other, less difficult, subjects and will help to produce motivated and successful students of those subjects if it is intelligently used. Examples are given in Part 3.

FACTORS WHICH CONTRIBUTE TO THE EFFICIENCY OF LEARNING

There are various factors which contribute to making learning more efficient or less efficient. They can all be accounted for, and organised, by means of Helmar Frank's 'Didactic Variables' (Frank 1969) and their subvariables (Bung 1972, Bung and Lansky 1978). Frank's Didactic Variables are:

- Subject matter (What to learn)
- Target standard (How well to learn it)
- Learning system (e.g. Which learner)
- Teaching system (e.g. Which teacher, computer, book, etc)
- Teaching algorithm (Which exact and effective teaching method)
- Environment (Where to learn)

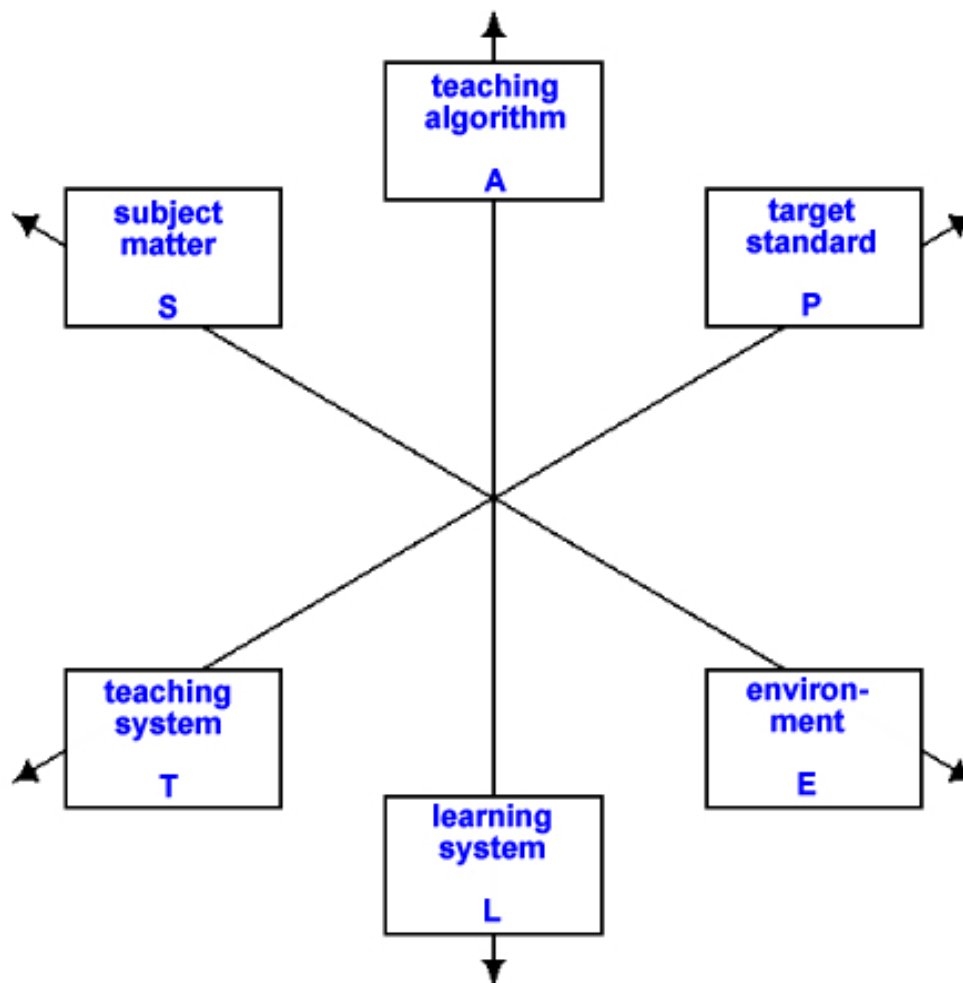


Image 1: The six didactic variables (Helmar Frank, 1969)

The term 'learning algorithm' denotes exact and effective learning methods available to the learner (learning system). Learning Algorithm is therefore a sub-variable of the variable 'Learning System'.

The theory of these variables has already been thoroughly discussed in other publications. I shall now merely name some of the factors which are not otherwise mentioned in this paper, since I presume that they are known and are being well manipulated in practice. The list is neither systematic nor exhaustive, and some of the concepts overlap. In listing some of these factors, I want to alert my readers and critics to the fact that I regard the Dynamic Learning Algorithms, which are badly neglected in practice and whose importance is provocatively underlined in this paper, as a necessary but by no means sufficient condition for successful learning. For this purpose it is enough if I name them informally. If these factors are not properly utilised in teaching and learning, be it through negligence or through perversity, then the effectiveness of the Dynamic Learning Algorithms can be destroyed. This, however, does not detract from their true value.

Conversely, the other factors cannot be fully effective, and discussions about them may deteriorate into trivial chatter, if the Dynamic Learning Algorithms and their underlying principles are not fully utilised. Here then are some of the factors which the Dynamic Learning Algorithms take for granted:

1. Personality of the learner
2. Willingness to learn
3. Talent
4. Prior knowledge
5. Learning methods
6. Correct models (e.g. no errors coming from textbook or teacher)
7. Memorable presentation of subject matter
8. Graphic and visual presentation of subject matter
9. Good explanations
10. Use of all senses (the fashionable expression for this is 'to use the right half of the brain')
11. Emotional involvement of the learner
12. Usefulness of the subject matter must be made obvious
13. Opportunities to apply the subject matter in practice
14. Rewards for good performance
15. Offer experiences of success (in the case of foreign language learning: stay abroad)
16. Relaxed state of mind while learning
17. Patience and persistence
18. In the case of language instruction: eliminate linguistic interference (e.g. from native language)
19. Memory aids
20. Time planning and progress control
21. Invest the required amount of time

The IDYLL METHOD has well-tested procedures which facilitate language learning for beginners, intermediate and advanced students, for example learning vocabulary, grammar and idioms (for beginners/intermediate learners), spelling and pronunciation (beginners/intermediate), foreign scripts (beginners), communication skills in speech and writing (intermediate/advanced), listening and reading comprehension (intermediate/advanced). This document deals mainly with the learning algorithms which enable beginners and intermediate students to efficiently absorb and retain large quantities of vocabulary, grammar and idioms at a 90% retention level for as long as they are useful.

These IDYLL core algorithms deal with short-term retention of:

- written language (PAPA-BASIC, PAPA-INTERMEDIATE, PAPA-PREFERRED)
- spoken language (LASPEX-BASIC, LASPEX-INTERMEDIATE, LASPEX-Preferred)

Long-term retention is covered by

- REV, the revision procedure for items of average difficulty
- ENFA, the enforcer procedure for items or exercises of extreme difficulty

THE STRUCTURE OF IDYLL EXERCISES

Turn whatever you want to learn into a quiz, a list of questions and answers:

- question > model answer [=correct answer]
- stimulus > response
- input > output

The question may be a real question:

Q: How many wives had Henry VIII?

A: 6

Q: How many wives, at most, is a Muslim allowed to have?

A: 4

Q: What is the most popular name for dogs in England?

A: Max

Q: What is the most popular name for dogs in Libya?

A: Gaddafi

Or the question may be just a word, e.g. to be translated from English into French, or the names of capital cities.

Translation questions:

Q the chair

A la chaise

Q I love you.

A Je t'aime.

Questions on capital cities:

Q Egypt

A Cairo

Q Libya

A Tripoli

LEARNING A FOREIGN SCRIPT: ARABIC

Q: /ba:/

A: ب

Q: /ta:/

A: ت

LEARNING A FOREIGN SCRIPT: HINDI

Q: ba

A: ब

Q: bha

A: भ

**PRACTISING PAIRS OF OPPOSITES:
ENGLISH FOR FOREIGNERS**

Q: black

A: black - white

Q: big

A: big - small

Q: young

A: young - old

Q: fast

A: fast - slow

Anything that you have to memorise, anything you have to remember, anything that can be tested can be converted into a quiz (aka Catechism).

Each question with its model answer is called an "**item**".

1 the chair
la chaise

2 I love you.
Je t'aime.

These are two items.

Assemble 10 items to form an **Exercise**. Number the items from 1 to 10. Number the exercises: Ex 1, Ex 2, etc.

Write all your items into a "**Workbook**". Usually size A6 (postcard size, 105mm x 148mm, or similar) will be ideal for vocabulary and short sentences. For long sentences use size A4 (letter paper, 210mm x 297mm, or similar).

Always write the model answer below the question, not beside it. Leave a blank line between each question and answer and the next question. Before you start learning, let an informant, teacher, expert, knowledgeable friend check that the exercise you have written does not contain any mistakes. Make corrections with correcting fluid. Your exercise must be extremely tidy; otherwise you will not learn well or you will learn mistakes.

Here is an example of a complete vocabulary exercise for beginners in German:

Exercise 1

- 1 yes
 ja /ja:/
- 2 no
 nein /nain/
- 3 good
 gut /gu:t/
- 4 the day
 der Tag /de:ɐ ta:k/
- 5 Good day, Good morning.
 Guten Tag! /'gu:tən 'ta:k/
- 6 the morning
 der Morgen /de:ɐ 'mɔRgən/
- 7 Good morning.
 Guten Morgen! /'gu:tən 'mɔRgən/
- 8 not
 nicht /niçt/
- 9 not good
 nicht gut /niçt gu:t/
- 10 beautiful
 schön /ʃø:n/

For learning the written exercises, you use PAPA, REV and ENFA.

RECORDING YOUR EXERCISES

The written exercises teach you the correct spelling. Sound recordings teach you the correct pronunciation.

When learning foreign languages, let your informant, friend or teacher, record the exercise for you and save it as an mp3 file.

Start the recording of each exercise by announcing its number: "Exercise 1". Announce the ending of each exercise: "End of Exercise 1". Announce the number of each item: "Number seven: Good morning".

Leave a pause after the question and after the model answer. The pause after the question must be twice as long as the model answer. The pause after the model answer can be the same length as the model answer but no less.

You can use a free program called mp3DirectCut to make these recordings and to lengthen the pauses.

For learning the spoken exercises, you use LASPEX, REV and ENFA.

We assume that at this stage the written and spoken exercise has been written down and recorded, has been carefully checked and is error free.

LEARNING THE WRITTEN EXERCISES WITH PAPA

PAPA is the "Pen And Paper Algorithm". You do not need a computer. In fact, you learn more intensively (concentrate better) if, in a quiet environment, you write your responses on paper rather than type them.

HOW TO TACKLE ONE ITEM

1 Here is an exercise prepared by a student and containing unknown words from a French novel he is reading. L1 = English, L2 = French. An English speaker is learning French.

1 to grate, grind, creak, squeak

grincer

2 He dismissed me. (Simple past)

Il me congédia.

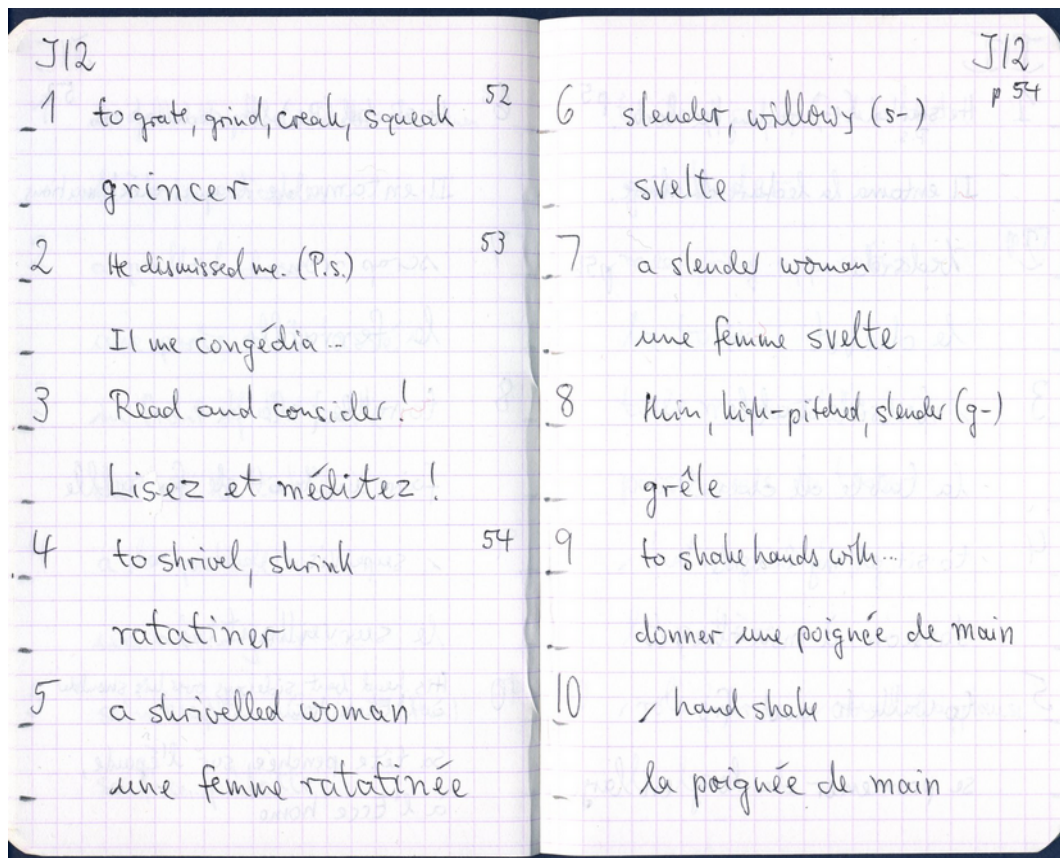


Image 2: English-French workbook

2 Take a piece of A5 paper (148mm x 210mm, or similar size), "the folding slip". Fold it in the middle so that the open side points upward.

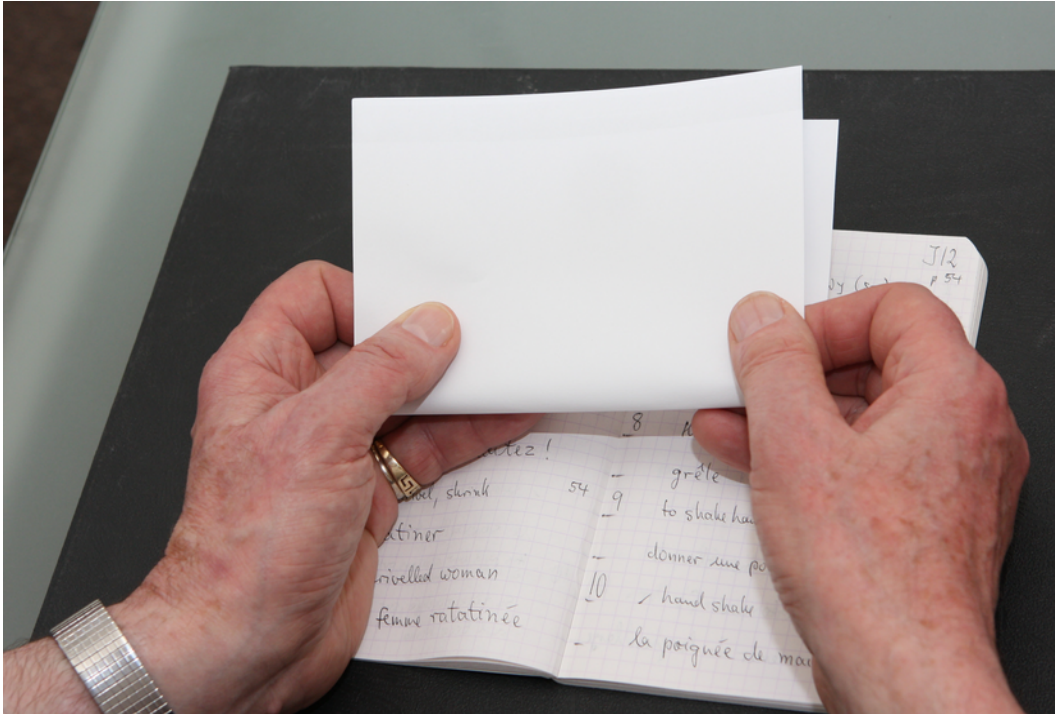


Image 3: How to fold

3 Cover the top of your exercise with it, and do NOT read the first items while covering them. Otherwise you will spoil the diagnosis of the system.

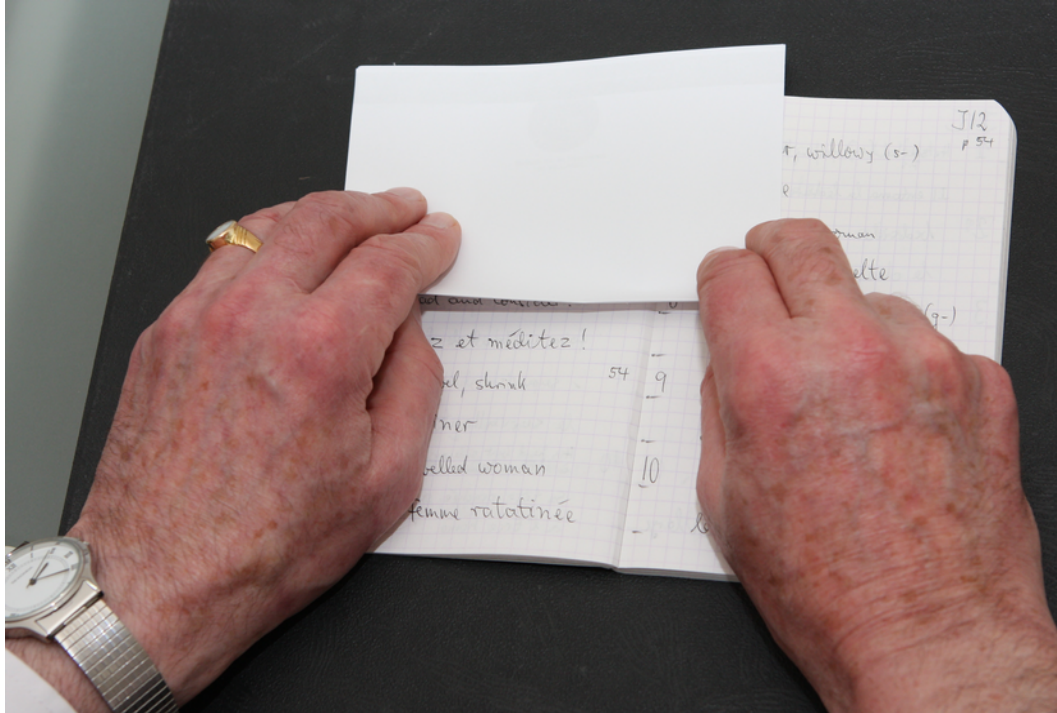


Image 4: Completely cover the top of the exercise

4 Slowly slide the paper down until the first question (e.g. "to grate, grind, creak, squeak") is revealed. Make sure you do not accidentally see the answer ("grincer").

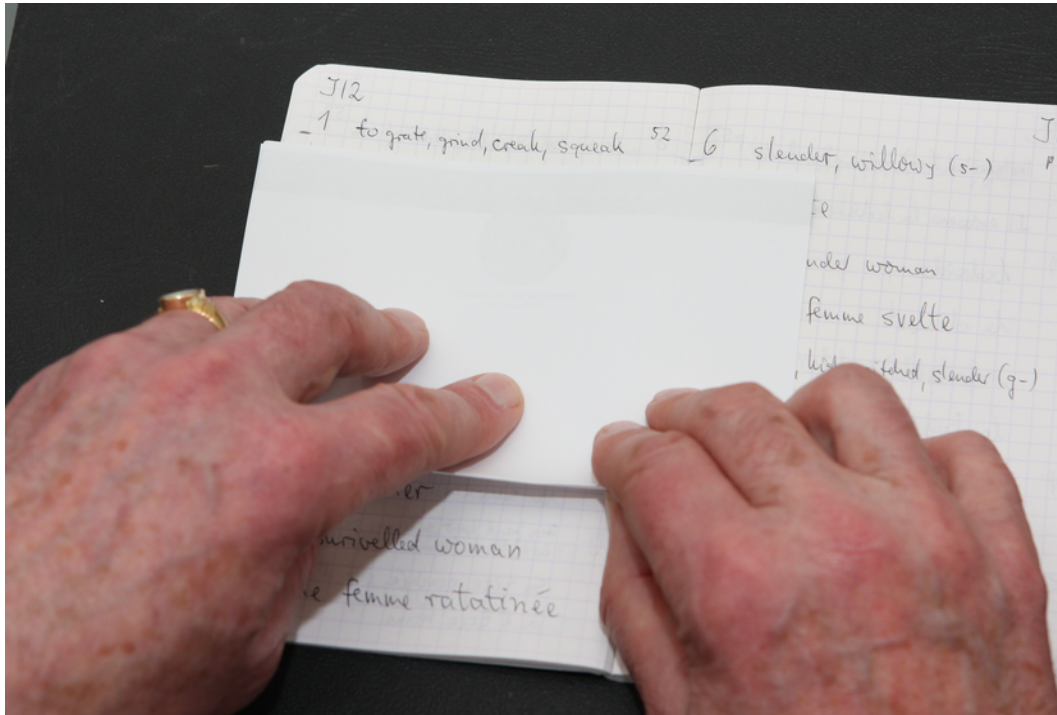


Image 5: Reveal the question

5 Guess the answer. Guess anything and write it on the folding slip, e.g. "granter". It does not matter whether what you write is right or wrong. Just reveal on paper what your mind is doing right now, as if it were a game.

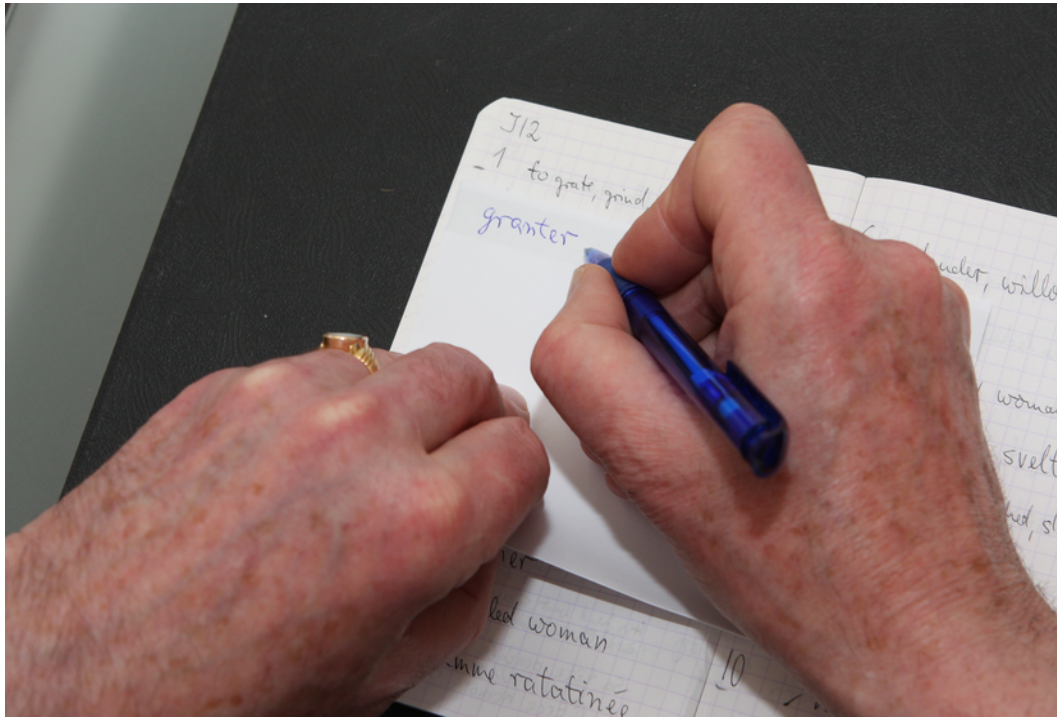


Image 6: Write down a guessed answer

6 Slide the folding slip down to reveal the model answer: "grincer".

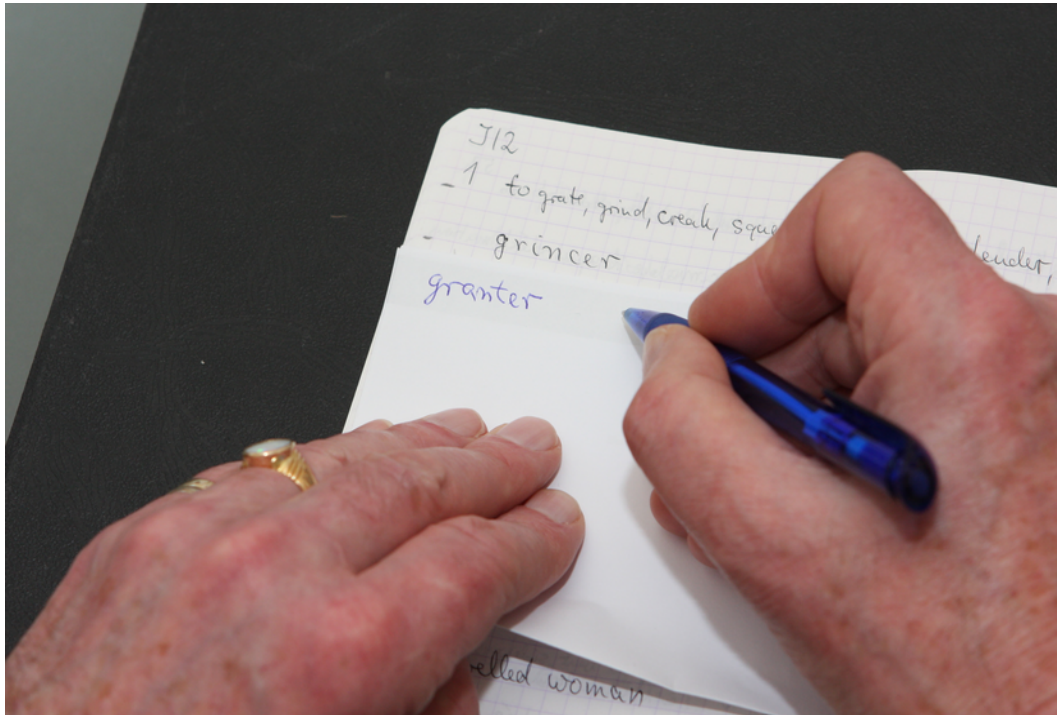


Image 7: Reveal the model answer

7 Compare your answer with the model answer. There are differences, but it could be much worse.

Congratulate yourself:

- You have written two syllables (not one, not three): that decision was correct.
- The ending is correct, "-er", i.e. you guessed the correct conjugation ("-ie" and "-re" would have been wrong in this respect).
- Five letters are correct, only two are incorrect, i.e. 71 per cent of your answer is correct.
- The spelling might not be correct, but you have come close to the pronunciation. The first incorrect letter "a" (instead of nasal "i") indicates that you have a hunch of the correct pronunciation. I.e. you are well on the road towards mastery.

This is a realistic observation and assessment of how your brain gradually comes to grips with a new item, trying this and trying that, rejecting the errors, pondering the little successes with satisfaction, until eventually all the letters (and the pronunciation) settle into place and can be allowed to harden. (In the traditional classroom these processes are ignored, but

they are important, especially for the "failing learner".) This battle with a new word is similar to the training of a wild horse. Eventually your horse will learn to obey. In the IDYLL METHOD this is known as the " 'xabaz syndrome". It is typical for the quarry work, lifting a stone onto the lowest conveyor belt, the most difficult task of all. What follows is child's play.

It is important that you never get angry with yourself. Instead, treat this as a game with strict rules and one inevitable outcome: YOU will win. You will reach MASTERY.

Along the way, like in a football match, the ball moves from one half of the pitch to the other. You remember something, then you forget again. You get it wrong, then right, then wrong again.

These are the doings of your brain, part of nature. Observe what is happening in your brain, watch it with amusement, but never talk yourself down, never get angry or upset. Just observe the facts (in this case, that your guessed answer differs from the model answer, i.e. it is still wrong), then simply do whatever the IDYLL METHOD prescribes, keep doing it, keep observing it, make the next move in this mental game with yourself, watch the ball move from one end of the pitch to the other and back again, and be assured that **YOU ALWAYS WIN** in the end.

It may take long, it may require many moves (that is nature, nothing to do with your talent or otherwise, just nature) but in the end YOU WILL WIN. This is the attitude you must develop, and with this attitude YOU ARE A WINNER.

OK. You observe a difference between the model answer and your guessed answer (wrong answer). Try to realise that this word has nothing to do with English "grant" or "grunt", that you need a "c" and not a "t" to start the second syllable.

Write down the number of the wrong answer, e.g. 1, and draw a circle around it: thus:

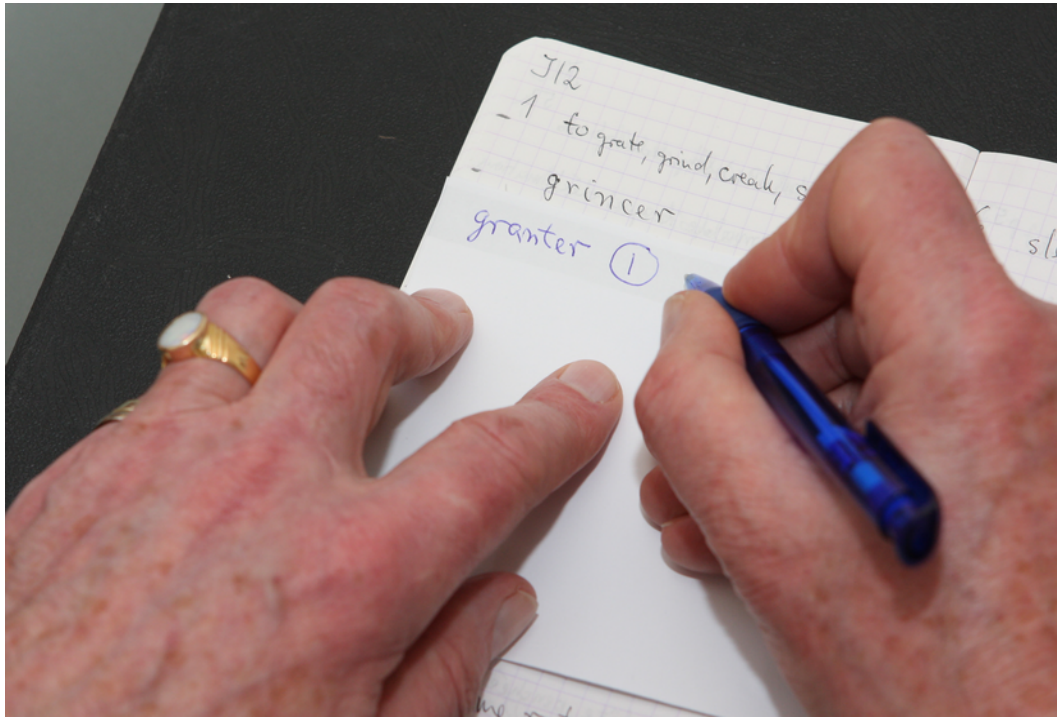
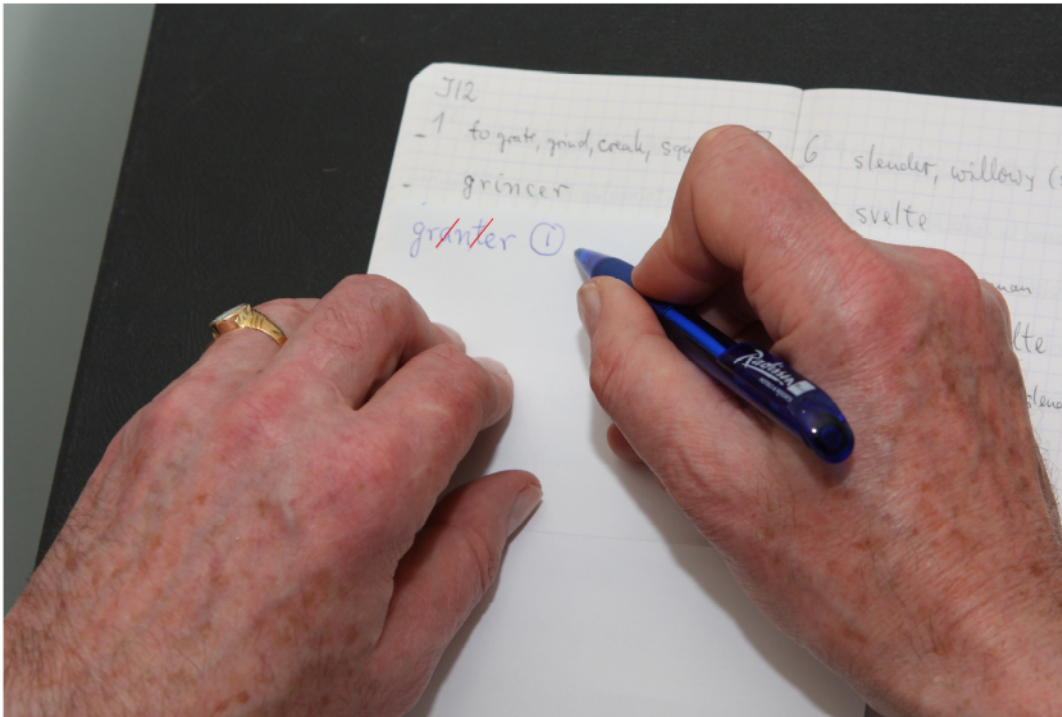


Image 8: Write down the number of the wrong answer and draw a circle around the number.

8 Cross out the mistakes.



The student uses his normal pen to cross out the mistakes. In the photograph we had to make the strokes red in order to make them sufficiently conspicuous.

Image 9: Cross out the mistakes

9 Copy the model answer onto your folding slip. While copying, but no longer, observe as much as you can from the model answer that might help you to make a better guess next time round.

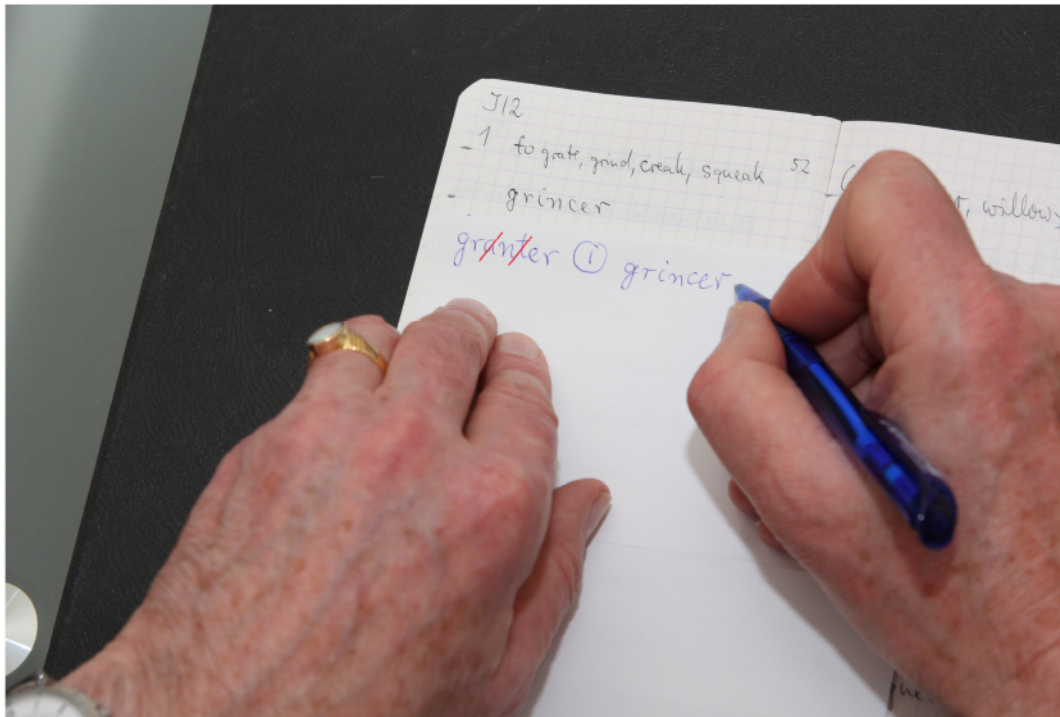


Image 10: Copy the model answer

In this case, "grincer", you might observe some of the following details (but you do not have to observe all at this stage; observe as many as you can easily take in while copying):

- 1 The first vowel is a nasalised "i".
- 2 The second syllable starts with a "c". Think of a creaking sound as a memory aid, or whatever memory aid you prefer.

10 Slowly slide the folding paper down to reveal the next question, Q2, the next item in the game.

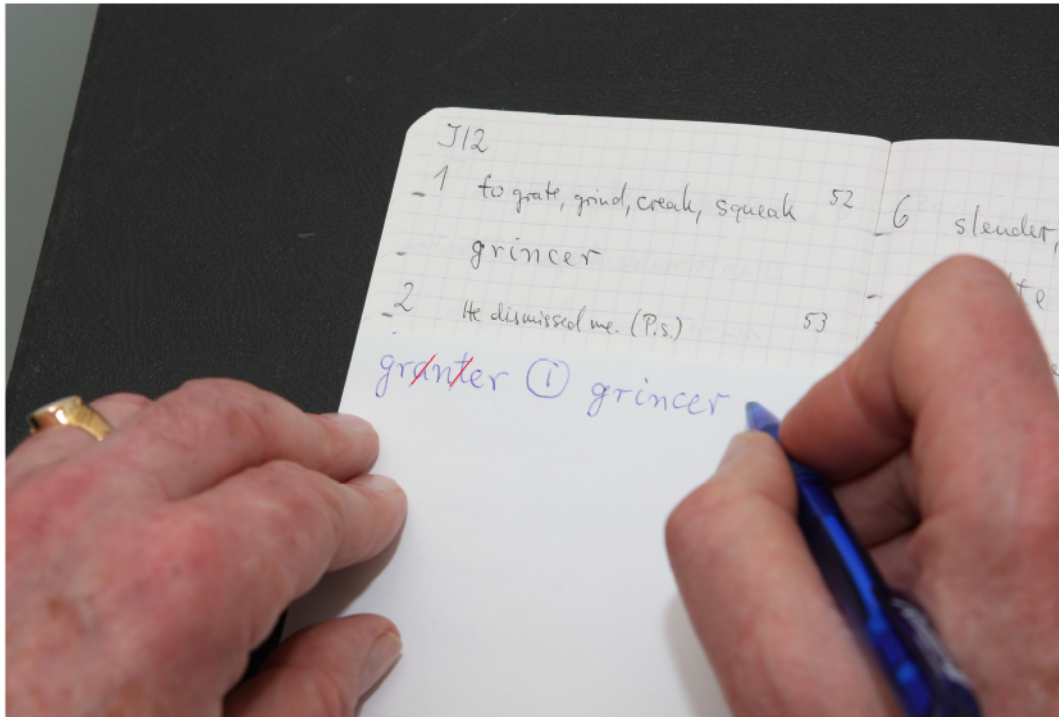


Image 11: Reveal the next question

You need **NOT** make any conscious effort to remember anything. Just observe the sort of thing that is easy to observe. You will re-visit this item often and, even without trying very hard, gradually your guesses will get closer and closer to the model answer, until they are perfect. This is inevitable. Just do as you are told.

THE THREE VERSIONS OF PAPA

PAPA controls the sequence in which you tackle the items in an exercise and indirectly controls the time intervals after which the items are presented and the retention times that are tested. The outcome is 100% correct answers. You must continue work on each exercise until you give 10 correct answers in succession. Anything less will seriously undermine the guarantees of the IDYLL METHOD and destroy your success in language learning. You must follow all our instructions in every detail.

PAPA comes in three versions:

- PAPA-BASIC,
- PAPA-INTERMEDIATE
- and PAPA-PREFERRED.

PAPA-BASIC is quick and easy to learn but less efficient than PAPA-PREFERRED.

PAPA-PREFERRED takes longer to learn than PAPA-BASIC but speeds up your learning enormously, makes learning of difficult items much easier, and eliminates every chance of frustration while learning.

PAPA-INTERMEDIATE sits in-between Basic and Preferred.

The correct sequence is therefore:

- 1 Use PAPA-BASIC for two or three exercises until you have got used to tackling the individual items and to using the folding slip.
- 2 Then abandon PAPA-BASIC and use PAPA-INTERMEDIATE for a few exercises.
- 3 Eventually use only PAPA-PREFERRED.

WHY THE TIMING OF ITEMS AND REVISIONS IS IMPORTANT

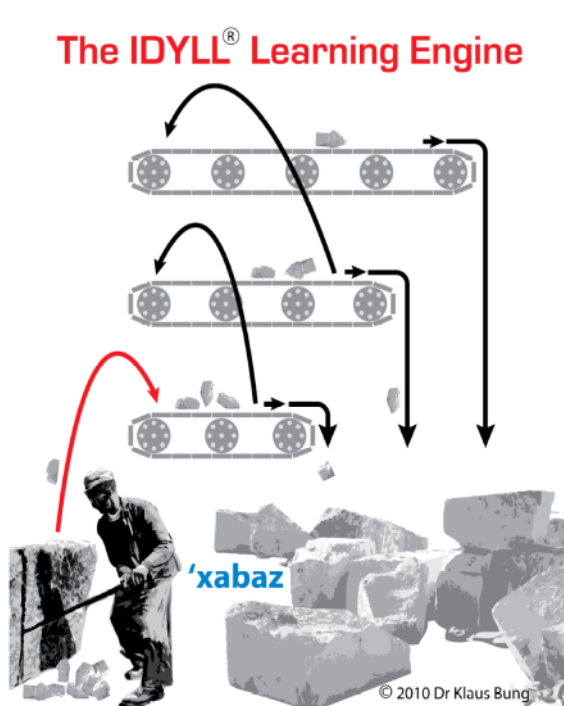


Image 12: Conveyor Belts Diagram (Quarry Diagram)

In the quarry you spend some time understanding words, phrases, sentences and grammar. You then learn to remember them for at least some short period of time. That happens in every classroom, but it happens at random. In IDYLL we control the retention times precisely. The IDYLL Learning Algorithms ensure that you remember an item first for seconds or minutes, then for hours, then for days, weeks and months. Difficult items are reliably built up syllable by syllable, letter by letter and phoneme by phoneme. All is engineered to perfection. Nothing is left to chance as in traditional language teaching and learning. The conveyor belts diagram shows the logic underlying these algorithms.

Every item is stored in your memory with a different retention span. During the retention span you can give correct answers. When the retention span has expired, you will give wrong answers. Revisions lengthen the retention span. To avoid wrong answers and frustration and to minimise learning time, you have to revise during the retention span and as late as possible during the retention span.

The diagram illustrates this. The process of analysing and understanding, of writing out your exercises in the form of a quiz and constructing and recording the exercises corresponds to the quarry work. PAPA then helps you to store one item for, say, 20 seconds, or one minute or three minutes. This is part of

"initial learning". It is equivalent to lifting a stone to the lowest conveyor belt.

After, say, 3 minutes, the stone will drop back into the quarry. All the lifting work will have been wasted. But this is what regularly happens in traditional teaching and learning. To avoid this waste, the stone has to be lifted to the next conveyor belt just before the end of the belt. And so on for each successive belt.

In IDYLL learning, this corresponds to revising each item (re-visiting each item) before its retention span ends. This is embodied in the IDYLL maxim: "Revise as seldom as possible, but as often as necessary". It is diametrically opposed to the silly advice regularly dished out to language students in traditional classes: "Revise as often as possible", which means in effect: "Don't revise unless you feel like it. All your other duties and activities are more important than language learning. And, if you don't revise at all, it is still OK, because it simply wasn't possible." As a result most traditional language students, if they revise at all, always revise at the wrong time, revise when the revisions are least effective, when the time they take is very long, and when they maximise their mistakes, which make revision an unpleasant experience.

The IDYLL algorithms ensure that items are re-visited before they reach the end of the conveyor belt and that items which fall off the conveyor belt are caught and given special treatment (through ENFA, the Enforcer Algorithm.) This activity is systematically maintained over a period of at least 8 months, or longer for items which require it.

**HOW THE TIMING OF ITEMS
IS ACHIEVED
IN PAPA-PREFERRED**

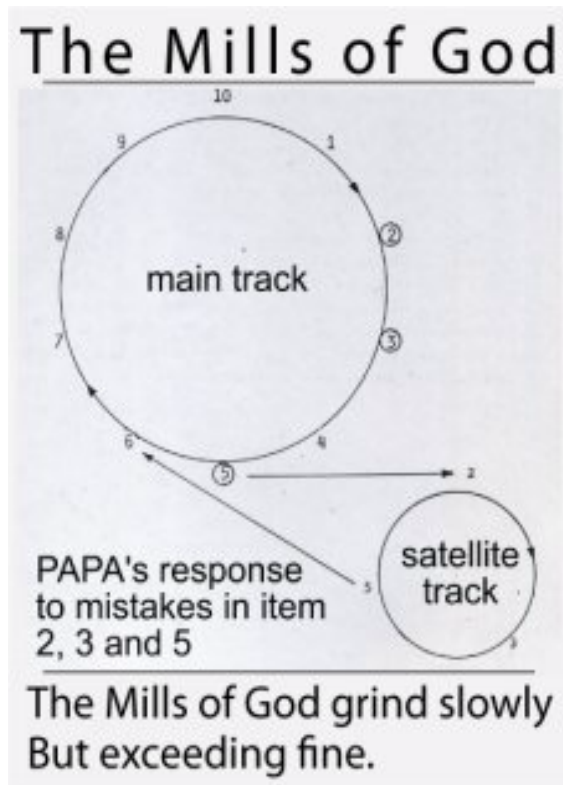


Image 13: The Mills Diagram

In the Mills Diagram, you see two tracks (two wheels). The main track (main wheel) represents the ten items of an exercise. PAPA-BASIC instructs you to tackle one item after another, from 1 to 10 and again from 1 to 10 etc, until you have given 10 correct answers in succession. The interval between one occurrence of item 3 (or whichever) and its next occurrence is always the same, e.g. 2 minutes. For some items this is fine. No student will find it hard to remember French "merde" (shit). For some items this unchanging interval is rather long. The student will have to revisit this item on the main track many times, giving different wrong answers each time, before he begins to remember it and respond correctly. But eventually he will. This is the "xabaz-syndrome" alluded to in the conveyor belts/quarry diagram.

In other words, PAPA-BASIC is effective, it leads to the goal of 100%, but is not as efficient as it could be, e.g. not as efficient as PAPA-PREFERRED.

When the student has learnt this version of PAPA-BASIC, he moves to PAPA-INTERMEDIATE, which is slightly more efficient than PAPA-BASIC. He mentally divides the Exercise into 3 Blocks.

Block 1 = Item 1 to 3,
Block 2 = Item 4 to 6,
Block 3 = Item 7 to 10.

He works on Block 1 until he has mastered it. Then on Block 2 and finally on Block 3. When he has mastered each Block in turn, he tackles the Exercise as a whole until he has mastered it.

The intervals in PAPA-INTERMEDIATE are shorter than those in PAPA-BASIC. That is why it is more efficient for initial learning. It is like setting a car into motion in first gear or even "half clutch" rather than trying second or third gear immediately. Car engineers and driving instructors know what they are doing. Language teachers often are less rational and distrust engineers. Why!

The Blocks in PAPA-INTERMEDIATE are static, i.e. each block always covers the same items regardless of the student's performance. The student is now ready to advance to PAPA-PREFERRED. In PAPA-PREFERRED the static Blocks are replaced by Groups, which are dynamic. The student tackles each item on the main track and tries to find wrong responses (unknown items). Whenever he has found three such items, these items constitute a group. They are placed on the Satellite Track for intensive practice. The members of the current group change dynamically, whereas the Blocks previously used were always the same. The blocks were static, the groups are dynamic.

PAPA-PREFERRED brings the Satellite Track into play. PAPA-PREFERRED collects 3 unknown items (= 3 wrong responses), e.g. items 2, 3 and 5. When it has found these, it places them on the Satellite Track. You now work your way round the Satellite Track. Forget about the burden of having to learn 10 items. All you have in front of you are 3 items. You re-visit them every 20 seconds or so, i.e. they are much easier to remember that long. By remembering them for 20 seconds, you are placing them on the lowest conveyor belt (the one with 2 minutes retention). When you have eliminated 1 item from the Satellite Track by giving a correct answer, you return to the main track to find another unknown item. The moment you have found it, you place it on the Satellite Track, where 2 items (left over from the last round) are still waiting. Again you work on the Satellite Track until at least 1 item has been eliminated. Then you return to the main track.

This is extremely efficient. The tasks on the Satellite Track are very easy. All that is required is a retention of 20 seconds or less. There is no classroom in the world where your starting tasks would be so easy. Making it easy at the beginning (20 seconds retention) and very gradually increasing the difficulty (retention span) is typical for the IDYLL METHOD. This applies not only to languages but to many other subjects as well.

In brief, it is well worthwhile making the effort of learning PAPA-PREFERRED. The time invested in learning it will be repaid over and over again. Like learning to drive a car. It costs money, takes many hours, possibly repeated failures in the test. But having learnt to drive saves you an immeasurable amount of time and trouble throughout your life.

USING PAPA-BASIC IN PRACTICE

Use PAPA-BASIC only for the first three exercises, to get a feel of how the folding slips work and the fantastic effect of REV, the Revision Algorithm, and the REVISION DIARY. Then spend some time learning thoroughly how to use PAPA-PREFERRED, or attend an IDYLL workshop.

"Next item" and "Next question" are defined by the main track on the Mills Diagram. After Item 1 comes Item 2, etc. After Item 10 comes Item 1.

Step 1: Tackle Item 1, or whatever is the next item.

- If your answer is correct, go to Step 2 (below).
- If your answer is wrong, go to Step 3 (below).

Step 2: What to do after a correct answer.

- Slide the folding slip down until you can see the next question (but not the answer).
- Try to answer the question.
- Then go to Step 1.

Step 3: What to do after a wrong answer.

Stay calm and observe, perhaps with amusement, what your mind has come up with this time and compare what your mind **SHOULD** have produced. While copying, also silently or aloud articulate (say) the correct answer as best you can.

Write down the number of the wrong item. Draw a circle around this number. (The circle marks incorrect answers.)

Copy the model answer onto the folding slip and make yourself aware of where and why you went wrong.

Go to Step 4.

Step 4: What to do at the end of an exercise.

Have you just tackled Item 10?

- If yes, go to Step 5 (below).
- If no, go to Step 1.

Step 5: You are at the end of the exercise.

Check if any circles (wrong-item markers) are visible on the folding slip.

- If yes, go to Step 6.
- If no, go to Step 7.

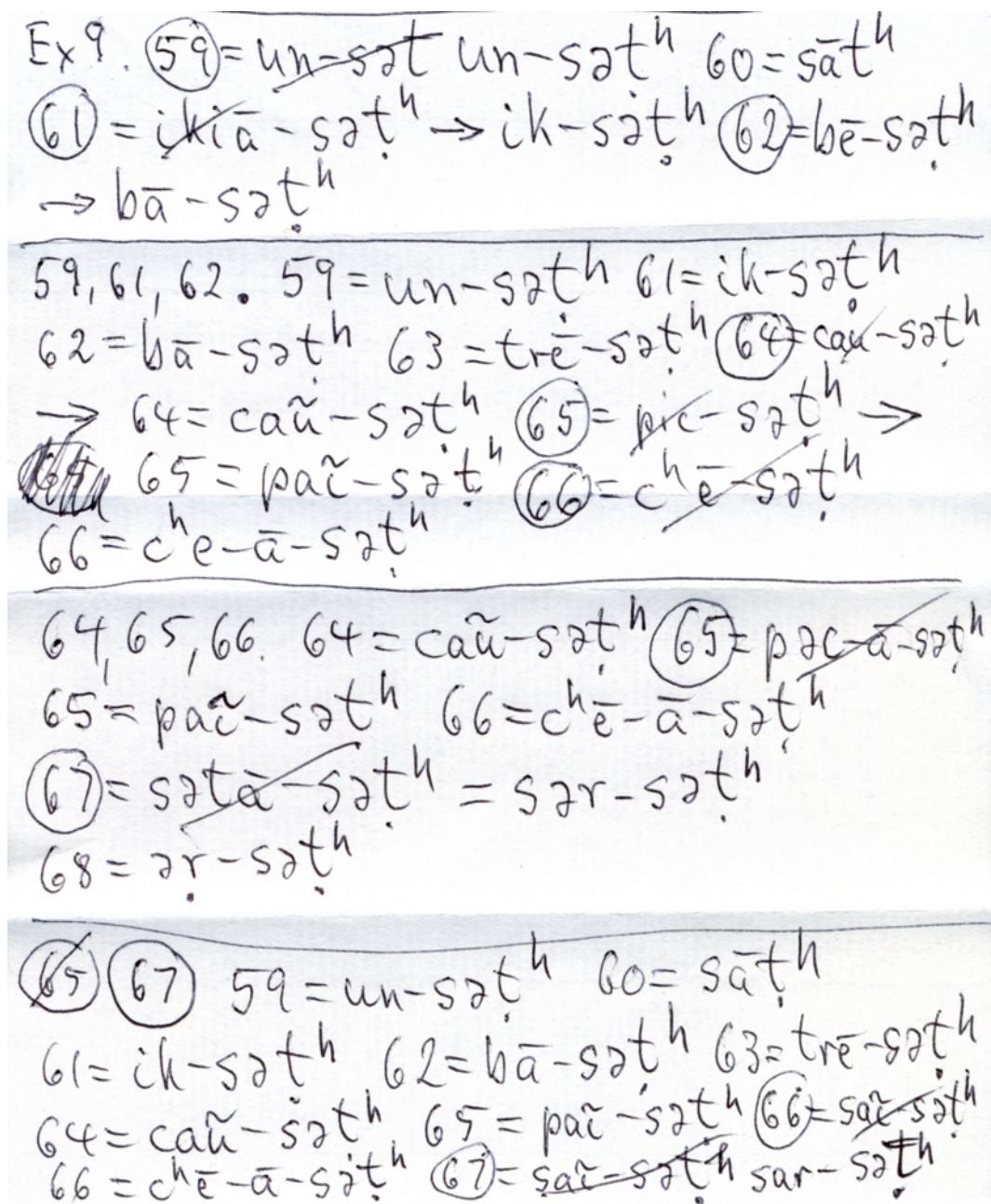
Step 6: Circles are visible.

Copy the circles and their numbers into the next line on your folding slip.

Fold the slip back so that the copied circles and their numbers are now visible on top of the slip, but that your previous answers on the slip are now invisible.

Go to Step 1.

Image 14: Folding slip: practising Hindi-Urdu numerals



Note: This student is learning the diabolical Hindi-Urdu numerals (nicknamed "The HURDle" or "The HUNs"). The horizontal lines show where the paper has been folded. Concerning the linguistic problems involved, see Bung 2010.

In this exercise, the student had to practise the numerals from 11 to 99. To avoid confusion, he therefore did not number the items 1, 2, ..., 10, but the numbers to be "translated" (59, 60, 61, ...) served as item numbers and appear on the folding slip.

Step 7: No circles are visible.

You have reached the passing score (100%) for this exercise. You can proceed to the next exercise or stop work for now. But make sure that you apply all the instructions of REV, the revision algorithm. You do not want to have wasted your time and forget what you have just learnt.

End of this procedure.

USING PAPA-PREFERRED IN PRACTICE

We assume that you have used PAPA-BASIC to learn at least three exercises, and that you are therefore familiar with using the folding slip, and writing down the item number in a circle when you have made a mistake. We also remind you of the Satellite Track in the Mills Diagram (above). Read that description again. The only difference between PAPA-BASIC and PAPA-PREFERRED is that PAPA-BASIC uses only the Main Track, whereas PAPA-PREFERRED uses the Satellite Track to help you focus on the unknown items, and make them easy to learn.

1 Use the folding slip and tackle one item after another.

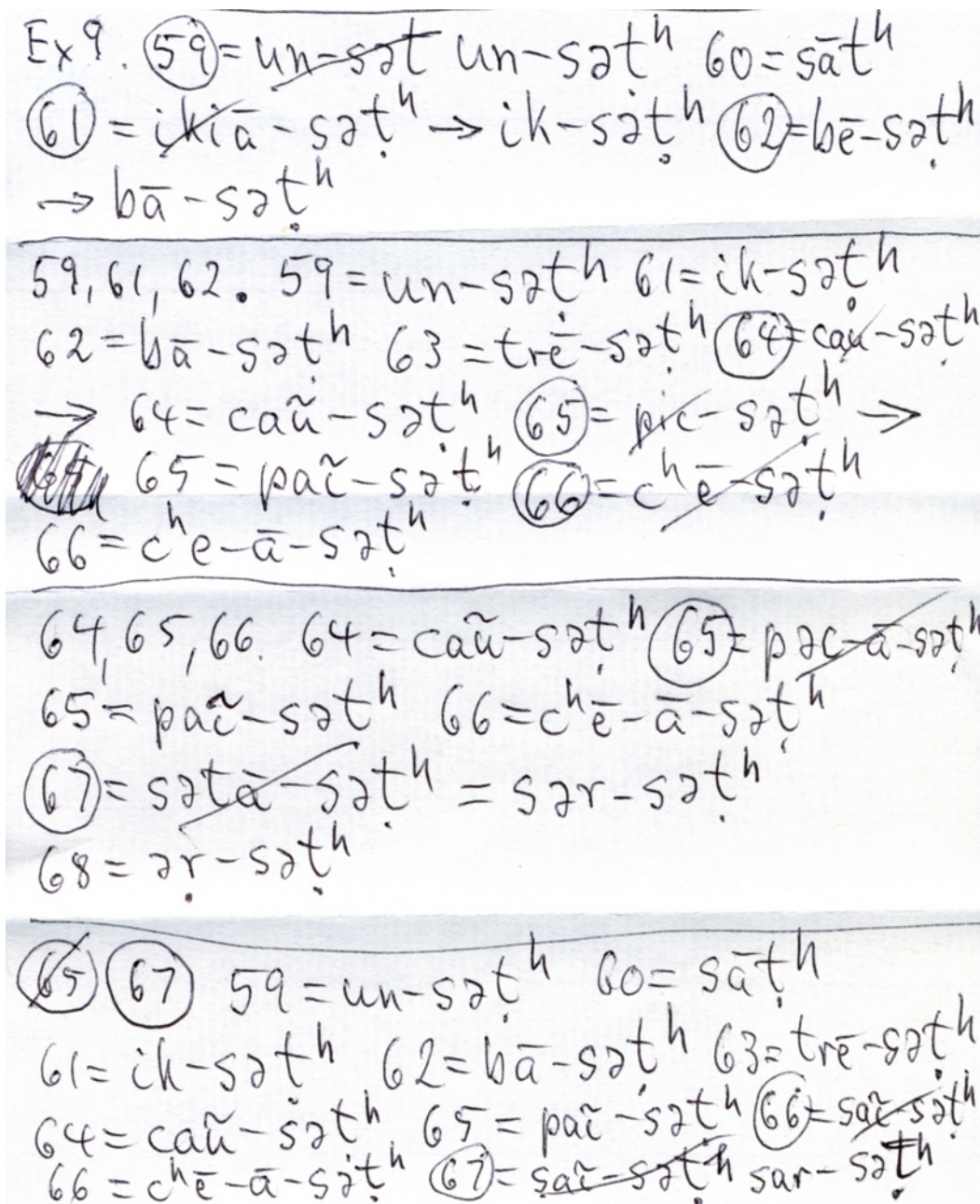
2 Compare your answers with the model answers. When you have made a mistake, write the item number into a circle on your folding slip. Copy the model answer and briefly try to figure out what went wrong and why. Don't spend more time on "figuring out" than you need for copying the correct answer. Your next attempt at this item need not be perfect, you just hope that you will have more correct letters and fewer wrong letters. Eventually it will be perfect - without any stress for you. While copying, silently or aloud articulate (say) the correct answer as best you can.

3 If your answer was correct, you need not copy (in writing) the model answer, but do articulate it (say it) as best you can.

4 As soon as three circles are visible on your folding slip, the Satellite Track comes into operation. Its "capacity" is three items, no more, no less.

a Copy the circled item numbers into a new line on your folding slip. Fold the slip so that the three circled numbers are visible but that your previous answers are invisible.

Image 15: Folding slip: practising Hindi-Urdu numerals



b Tackle each of the circled items in succession, e.g. if the circled items are 2, 3, 5, then tackle these three items again and again, until you get one of them right.

c When you get an item right, cross out its circled number. This removes it from the Satellite Track. There are now only two circles visible on your folding slip, i.e. only two items waiting on the Satellite Track. The Satellite Track stops and you return to the main track, as shown in the Mills Diagram.

d You are now trying to find another unknown item (wrong answer). As soon as you have found one, you rejoice, and write down its number in a circle. Now three circles are visible again, and the Satellite Track, "the language learner's best friend", starts running again. Write the circled number into a fresh line on your folding slip, fold the slip, and try to eliminate one of the three items.

5 When you come to the end of the exercise, item 10, you have to return to item 1 (as shown in the Mills Diagram). But first you have to fold the slip to make your previous answers invisible. (Cheating will harm you badly. You will lose the success guarantee of the IDYLL METHOD and you may fail to learn the language.)

6 Before folding the slip, you have to preserve the circled item numbers which are waiting to enter the Satellite Track. Therefore, if there are any circled numbers visible,

- copy them into a fresh line together with their circles.
- Then fold, immediately above the circled numbers.

Image 16: Italian exercise

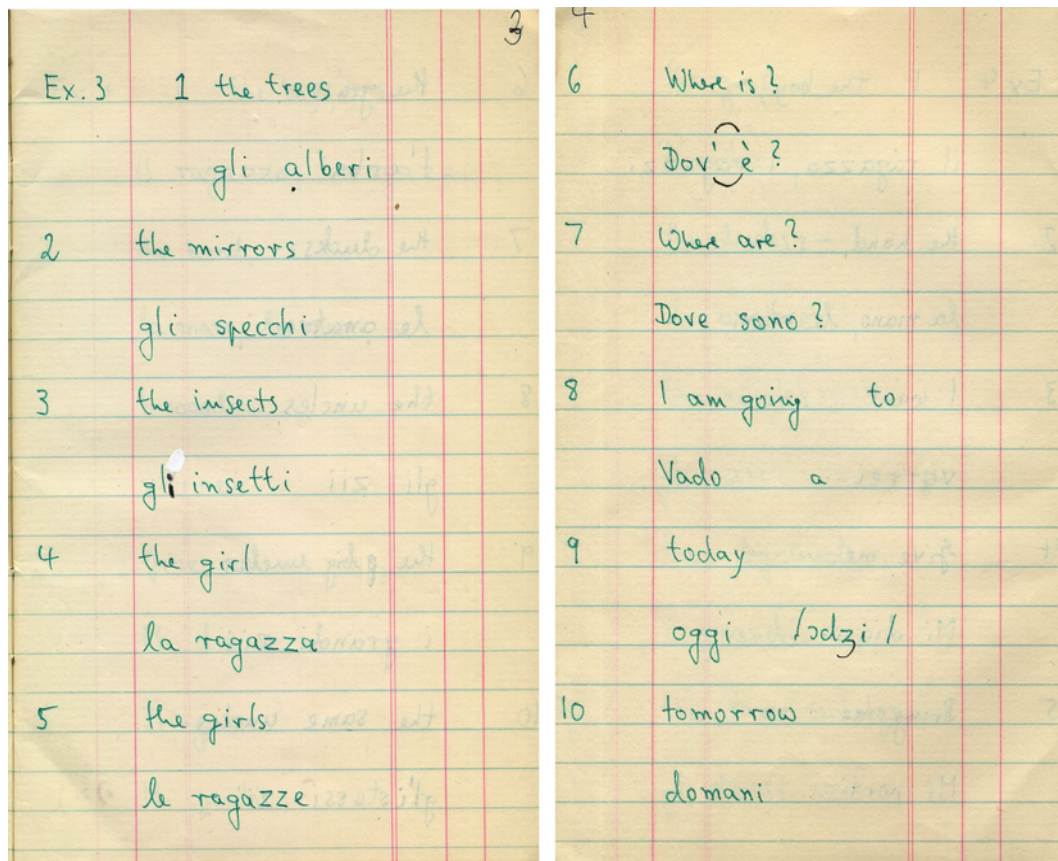
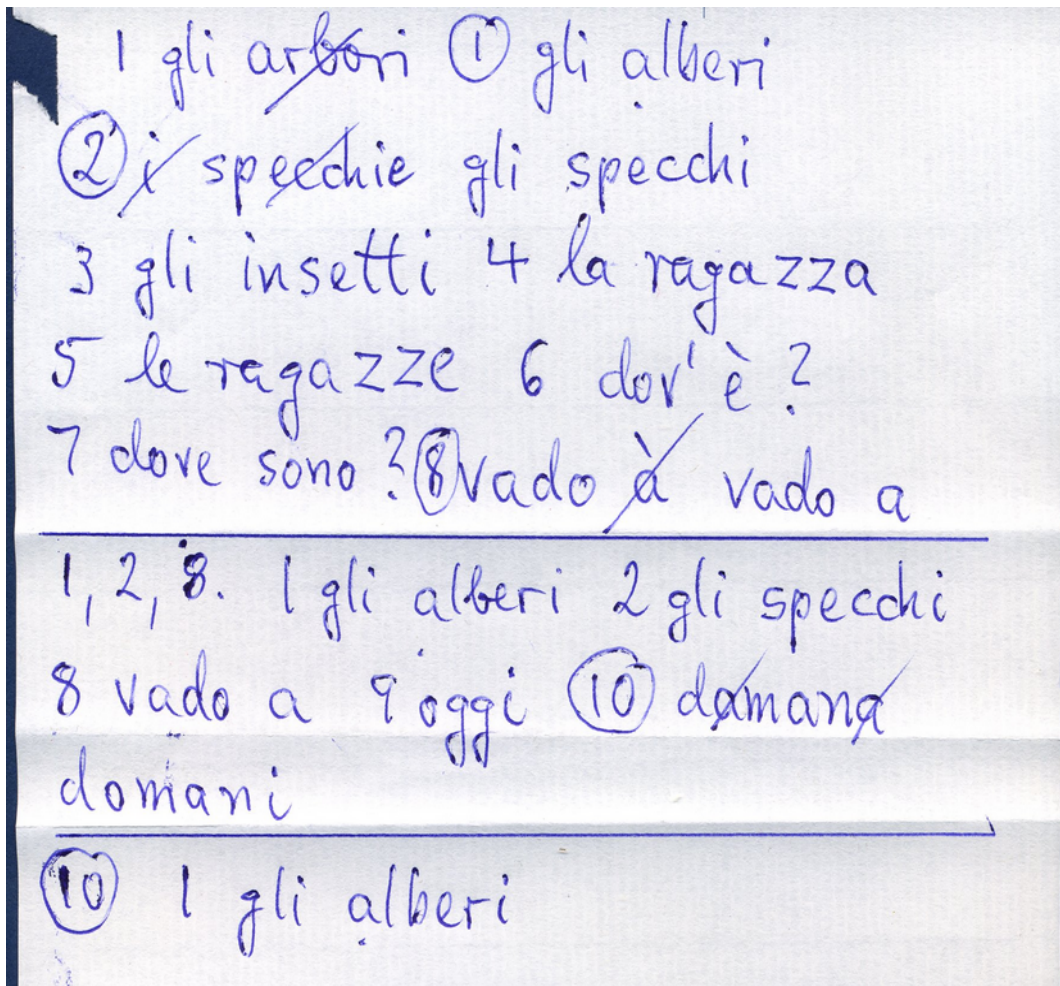


Image 17: Folding slip, showing End-of-Exercise situation
 Any circled numbers visible between the last fold and the next fold (now due because the end of the exercise has been reached and the student has to return to the beginning) must be copied and preserved on the next line before the paper is folded. In this case, there is only one circled number, 10 in a circle.



The horizontal lines show where the paper has been folded.

7 Slide the folding slip to the very top of the exercise, then slide it down slowly until you have revealed question 1.

8 Keep doing the exercise from beginning to end (on the Main Track), occasionally interrupted by a sprint on the Satellite Track, until you have given 10 correct answers in succession, i.e. you have reached the passing score (100%).

10 Now practise the spoken version of the same exercise with LASPEX until you have reached the passing score (10 items correct twice running).

11 Update your REVISION DIARY and apply REV. Do not forget the revisions during the first 24 hours prescribed by REV. They are most important to make learning easy and fun: Revise after 15 minutes, then after 60 minutes, then in the evening of the same day, then any time during the next day. You will be stunned by your own successes.

**ADJUSTMENTS TO PAPA-PREFERRED
FOR SLOW LEARNERS OR DIFFICULT LANGUAGES**

The normal capacity of the main track is 10 items, i.e. each standard IDYLL exercise consists of 10 items.

The normal capacity of the Satellite Track is 3 items, i.e. it comes into operation when 3 unknown items have been found on the main track.

This works well for most learners and for many languages, e.g. for English people learning a closely related European language: French, Spanish, German etc. But it may not work well enough for difficult languages (e.g. Russian, Chinese, Arabic, Farsi, Urdu, Hindi, Telugu, Tagalog, etc) or for slow learners learning a language which other learners find easy (e.g. English speakers learning Spanish).

In such situations (slow learner, or difficult language) we change the capacity of the main track from 10 to 5, and the capacity of the Satellite Track from 3 to 2.

The result in practice is as follows:

1. Main track: Tackle items 1 to 5 with the same rules which normally apply to items 1 to 10. After item 5 return to item 1 and keep practising item 1 to 5 until you have 5 items correct in succession, i.e. passing score of 100%. Bring in the Satellite Track as soon as you have found TWO unknown items and circled their numbers.
2. When you have mastered items 1 to 5, work on items 6 to 10 in the same way.
3. When you have mastered 1 to 5, and 6 to 10, each block on its own, tackle items 1 to 10 of the same exercise in accordance with the normal rules, i.e. change the capacity of the main track back to 10 and of the Satellite Track back to 3.
4. When you have mastered the 10-item exercise like everybody else, you can proceed to the next exercise, again splitting it into two halves, to start with.

This adjustment makes slow learners fast and difficult languages easy.

INFINITE SIMPLIFICATION

**IDYLL maxime:
No task is so easy that it cannot be made even easier
for learners who require it.**

IDYLL has many tools for such learners. The "easy" task which has proved too difficult for some learners is broken down into easy constituent tasks (Cartesian method). When these have been mastered, they are carefully sequenced and synthesised to gradually build up the desired more complex skill.

The simplification of tasks (breakdown of tasks) can be done stage by stage, level by level, until the tasks are sufficiently easy for the student.

Traditional teachers are often not willing to simplify tasks as much as is necessary. Instead of adjusting their methods to the needs of certain students, they declare these students to be untalented or unable ever to learn a foreign language.

ADJUSTMENTS TO PAPA-PREFERRED FOR FAST LEARNERS AND FAST FORGETTERS

Occasionally one finds students who reach the passing score (100%) very quickly but also forget unusually fast. I have found computer programmers performing like this. They sometimes go through an exercise once making the normal number of mistakes, but during the second run get every item correct.

So far so good. But here is the other side of the coin. When you test them the following day, they have forgotten 80%, when normal learners (who spent much longer on initial learning before reaching the passing score) forget only 10% or less.

Such learners have to be forced to spend more time on initial learning, to ensure that the items are deposited in a memory layer with a sufficiently long retention span.

If you are of that type, you change the capacity of the main track to 20, but leave the capacity of the Satellite Track at 3. Then apply the normal rules, adjusted to these new capacities. The passing score for this type of learner is now "20 items correct in succession" (rather than "10 items correct in succession", as for normal learners). To achieve this standard, the student has to spend much more time on initial learning than he would in the normal system, he would revise items APPARENTLY known many more times, and thus ensure their long-term retention.

If you are such a student, you will proceed as follows:

- 1 Treat two successive exercises of 10 as if they were one exercise of 20. Assume the exercises are called Exercise 13 and Exercise 14.
- 2 Learn Exercise 13 with the normal track capacities until you have reached the passing score of 100%. Do the same with Exercise 14.
- 3 Increase the capacity of the main track to 20, i.e. try to answer all items in both exercises correctly in succession, bringing in the Satellite Track where required. Go through all 20 items for as often as it takes, so that you achieve long term retention. If you make foolish mistakes (lack of concentration), concentrate better on those items, but do not abandon the algorithm and the required target standard.

**LASPEX-BASIC:
LEARNING ALGORITHM FOR SPOKEN EXERCISES**

You already know about the structure of LASPEX exercises. There is a long pause before the model answer and a short pause after the model answer.

During the long pause, you try to say the answer as best you remember (right or wrong). During the short pause, you always repeat the correct answer.



LASPEX Scoring Sheet

[illegible]

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Image 18: Blank scoring sheet

To aid concentration and to keep a record of your answers (right or wrong) you use a blank scoring sheet (grid) or a scoring book. You fill in the cells on top of the sheet, as follows:

Exercise No:

Date:

Home/College: (Note 1)

Position: (Note 2)

Run No: (Note 3)

- Note 1: Write H or C or some other suitable abbreviation. If you are studying in class and at home, your location while doing the exercise (class work or home work) may make some difference.
- Note 2: If you are using an old-fashioned cassette recorder with position counter (which is ideal for LASPEX-Preferred), you always start with the tape at its very beginning and set the position counter to zero at that point. Then spin forward to the beginning of the wanted exercise. The exercise will then always have the same position number, and you can easily find its start. If you need repeated access to any item inside the exercise, you write its position number in small letters into its cell. Adjust this as required if you use different software (e.g. mp3DirectCut) for listening to your exercises.
- Note 3: Each Run is one pass through the exercise. You count 1, 2, 3 etc. The next exercise starts with Run 1 again, on the same scoring sheet.

You tackle each item in the exercise from 1 to 10. Make a tick when you have given the correct answer, leave a blank when you have given a wrong answer or hesitated too long (e.g. had to pause the mp3 player, etc).

When you have reached the end of the exercise, count the number of ticks and write the total into the bottom cell.

Do one run after another through the exercise, write the totals into the bottom cell. Watch the totals gradually go up. Do not be dismayed if occasionally they go down or stay the same.

Continue this until you have reached the passing score, which for LASPEX is 10 correct responses TWICE RUNNING.

For LASPEX-BASIC any mp3 player or media player will do.

LASPEX--INTERMEDIATE: LEARNING ALGORITHM FOR SPOKEN EXERCISES

LASPEX--INTERMEDIATE is one step above in efficiency from LASPEX-BASIC but you need either an old-fashioned audio-cassette player with a position counter or some other suitable mp3 software to handle it. In the absence of such devices you have to stick to LASPEX-BASIC. You can be comforted by the fact that PAPA will have given you such good writing skills for the same exercises

that you will not find it difficult to pick up the corresponding speaking skills.

LASPEX--INTERMEDIATE and Preferred were indispensable at a time when teachers were giving spoken exercises to their students without preparatory work in writing.

For LASPEX--INTERMEDIATE, the exercise is divided up into 3 blocks.

Block 1 = Item 1-3
Block 2 = Item 4-6
Block 3 = Item 7-10

Each block is first practised on its own (following the rules of LASPEX-BASIC), until the 100% passing score is achieved. Then the whole exercise is brought up to passing level, i.e. 10 items correct twice running.

If teachers and schools provide spoken recordings for these exercises, it is suggested that they provide the following for each exercise:

- a recording of the complete exercise, with gaps during which the student can speak his answer
- the three blocks as independent mp3 files, so that any mp3 player can handle them

The Blocks in LASPEX--INTERMEDIATE are static. They are the same for every student regardless of his performance. By contrast, LASPEX-Preferred uses "Groups" of items. These groups are dynamic, they are assembled by each student on the basis of his correct or incorrect responses. They are then practised until mastery is achieved. Then they "evaporate", and a new group is assembled.

ADJUSTING LASPEX TO FUTURE TECHNOLOGIES

Block 1 = Item 1-3
Block 2 = Item 4-6
Block 3 = Item 7-10

It can be desirable for efficient learning, that the student first practises Block 1 until he has mastered it, then Block 2, and then Block 3, and then the 10-item exercise as a whole.

These technical notes describe how this was done with tape recorders and cassette recorders (now obsolete).

The exercise recordings always consisted of 10 items. Various methods were then used by the student to access first Block 1 and practise it, then Block 2 and then Block 3. A position counter (then available) was used for that purpose.

Current mp3 players, and their successors, will probably not have such counters. Since the student needs Blocks 1, 2 and 3 and the complete exercise of 10 items separately and easily accessible, I suggest that for each exercise four mp3-files (or whatever future format) are created. For exercise 12, for instance:

Ex 12-a: Block 1
Ex 12-b: Block 2
Ex 12-c: Block 3
Ex 12-d: Items 1 to 10

Good students who do not require the blocks will then practise only the complete exercise, e.g. Ex 12-d. Weaker students will benefit by practising the blocks first.

**LASPEX-PREFERRED:
LEARNING ALGORITHM FOR SPOKEN EXERCISES**

**PREPARING A CASSETTE RECORDER
FOR WORK WITH LASPEX-PREFERRED**

Note: The following instructions may now (in 2022 AD) be superfluous because cassette recorders are no longer made. But it is worth studying and understanding the underlying principles and then applying them, suitably modified, to whatever technology may be available in years and millennia to come.

If you have an old-fashioned cassette recorder with a position counter, you can use LASPEX-Preferred, which is much more efficient than LASPEX-BASIC. If you have any other media player which enables you to conveniently access individual items within an exercise, you can use that. We are still trying to find such a device, and one which is simple and inexpensive enough to be used by the general public.

To prepare your spoken exercises for use with a cassette recorder, you have to do all or some of the following things.

- 1 Copy the exercises from their original medium (e.g. mp3) onto a cassette tape.
- 2 Spin the cassette tape to its beginning and reset the position counter to 000.
- 3 Play through the entire cassette and note the starting position of each exercise (item 1) in your scoring book.
- 4 Whilst doing an exercise, you will sometimes tackle a "group" of three items in an "intensive run". When this happens write the position number for the first item in the group in pencil into the cell corresponding to this item.

The following illustration shows the scoring sheet which recorded the actions of an imaginary student using LASPEX.

Sample of LASPEX Scoring Sheet

Exercise No.	75													
Date	10.5. 2010													
Home / College	C													
Position	326													
Run No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓
2		...	✓				...	✓	✓		✓	✓	✓	✓
3	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓
4		...	✓	✓	✓		✓	✓		✓	✓	✓	✓
5		✓	✓				...	✓	✓	✓	✓
6		✓	✓		✓		...	✓	✓	✓	✓
7	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓
8		...	✓		✓	✓	✓	✓		✓	✓	✓	✓
9		...	✓				...	✓	✓		✓		✓	✓
10				✓	✓	✓	✓		✓	✓	✓	✓
Total correct	3		7		8	8		9	8		10	9	10	10

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Image 19: Filled scoring sheet of sample student

INFORMAL DESCRIPTION OF LASPEX-PREFERRED

If you want a more precise description of this algorithm, go to the website (click Practical Advice).

Look at the scoring sheet which illustrates all situations which can possibly occur while working through a spoken IDYLL exercise.

Column 1

You start with a test run to establish your prior knowledge of the exercise. In a test run you tackle one item after another, from 1 to 10. You make a tick for each correct answer and leave a blank for an incorrect answer.

Count the number of ticks (correct answers) and write it into the bottom row (Totals correct).

- If you have 10 items correct in that column, you proceed to the next exercise.
- If you have fewer than 10 items correct, you must continue practising until you have 10 items correct TWICE RUNNING (see the Totals in column 11 to 14).
Column 11 was not sufficient proof of mastery.
Column 12 proved that the good results in Column 11 were not mastery but luck.

Column 2

If you have three items or fewer correct in Column 1, you must make an "intensive run". Intensive runs enable you to focus on difficult items. Therefore they lead very quickly to mastery.

You divide the items of Column 1 into groups of 3 or 4 items: 1-3, 4-6. 7-10.

In intensive runs. you use the same column repeatedly and you mark each correct answer with a dot and not with a tick. You do not mark wrong answers.

You do each item in the group (e.g. 1-3) until you have at least 3 dots in each cell. That is the target for a group. Then you go to the next group, until you have mastered all groups in that column. You do NOT count and write down the total number of ticks in an intensive run. Example: Column 2.

Column 3

After each intensive run you do a "through run". Its purpose is to establish and record how much you have benefited from the intensive run. You expect the totals to increase.

At the end of each through run, e.g. Column 3, you write down the total. Then you inspect the column and look for two or more vertically adjacent blanks. There are two such blanks in Column 3. They are a "convenient target for attack" because they are adjacent, both are unknown, and you focus on them to eliminate them from the list of unknown items. You spin the cassette recording back to that position, pencil the position number into

the cell for the first item of the group, and then start practising that group.

Each group, however, requires three items to ensure that the intervals between repetitions of each item are long enough to give you a chance of forgetting, and valid proof of success when you get them right. The items with blanks (where you gave the wrong answer) are called "critical items". Since in Column 3 you have only two critical items, you add a non-critical item (item 4) to make the group complete.

Column 4

You now do an intensive run on the items you have identified as critical in Column 3.

Column 5

Now you have to assess (measure) the results of the intensive run. You want to see the totals going up, and you want to see that you are getting the critical items right.

The total in Column 5 has gone up, and you got the critical item right.

You inspect column 5 and look for vertically adjacent blanks (convenient targets for attack). There are none. You have not yet reached the target standard [10,10]. Therefore you have to do another through run: Column 6.

Column 6

You compare the totals in column 5 and 6: no progress. If you did more through runs, you could carry on like this forever. You do not want to waste time. You have to concentrate on the two items which did not improve. You have to shorten the intervals between the repetitions of these items to anchor them in your memory. These are defined as "difficult items", i.e. items with horizontally adjacent blanks. Difficult items are items which can not be mastered by "soft methods", i.e. by through runs.

Whenever you have two through runs in succession, you inspect the last two columns for vertically adjacent blanks. Item 2 is a "difficult item" but to tackle it in an intensive run, you need a group of 3 items. You therefore add two non-critical items and get the group 1, 2, 3. Similarly you establish the group 8, 9, 10 at the end of the exercise, because Item 9 is also a difficult item (horizontally adjacent blanks).

Column 7

You do the intensive runs defined in the previous two columns.

Column 8

You measure progress by doing another through run. There is progress: 9 items correct. You cannot find a critical item in Column 8, therefore you do another through run.

Column 9

The total correct is 8, as opposed to 9 in the preceding column, i.e. your performance declines. That is a warning sign. You inspect both columns to identify the problem and then to tackle it with vigour.

You notice that items 5 and 6 are now wrong whereas they were right before. Don't be dismayed by that observation (as many students are). This is quite normal in human memory. What you know fades in and fades out. Observe the workings of your own mind with interest and slight amusement, never never never get angry with yourself, never say that you are a bad learner or have a bad memory. These comings and goings in memory are normal like the wind in nature blowing this way and that.

Just do what the algorithm tells you and gradually your memory will get steady and slightly more reliable, but never completely reliable.

You now form a group for an intensive run.

Column 10

Item 5 is defined as a "difficult item" (horizontally adjacent blanks), and item 6 together with item 5 makes a "convenient target for attack" (vertically adjacent blanks). Item 7 is a non-critical item used as padding to make the group complete.

Column 11

You check your progress by making a through run. Hurray, 10 items correct. However, this is not the end of the story. We must make sure that this is not an accidental success. The IDYLL METHOD gives you fantastic guarantees of success. This can only be achieved if you work like a master craftsman. Do everything to perfection. Follow the instructions to the letter. Do not take even the slightest risk. Your memory (which houses your knowledge) is like the vaults in the Bank of England: you do not want its treasures to be stolen.

Your target of mastery is: 10 items correct TWICE RUNNING. Remember, it has happened before in this exercise that in one column you got an item right, and in a later column you got it wrong. That must not be tolerated.

So you do another through run.

Column 12

Lo and behold, your scepticism was justified. One item is wrong again. You have not "forgotten" it. Nobody can say what you have forgotten or not, but you "got it wrong", and that's what we go by. We don't care whether or not you "forgot" something, but we give you procedures through which you can make sure that you "get things right".

You inspect Column 12 and look for a "convenient target for attack" (vertically adjacent blanks). You cannot find any. Therefore you do another through run: 10 correct - and another through run: 10 correct.

Column 13 and 14

You have achieved mastery and can have a rest or move on to the next exercises.

IT IS THAT EASY. IT IS THAT FOOLPROOF.

("And God saw that it was good": the seventh day.)

USING REV FOR ACHIEVING LONG-TERM RETENTION

What you have done so far was

- first "quarry work": analysis and understanding
- then "initial learning" through PAPA and LASPEX. Initial learning gives you 90% retention for 15 minutes. It corresponds to lifting the stones from the quarry to the lowest conveyor belt.

In the course of the next eight months, REV, the Revision Algorithm, in combination with ENFA, the Enforcer Algorithm, and with the non-algorithmic exercises of the IDYLL METHOD, ensures that you achieve 90% long-term retention. It estimates the retention times for each exercise and each item, and lets you make a revision (= bring the standard back to the passing score of 100%) before you forget rather than after you forget. This

- makes revisions pleasurable (experience of success rather than failure),

- minimises the learning time (spend as little time on revisions as possible, but as much as necessary)
- and makes the revisions as effective as possible (maximises the increase of the retention span achieved by each revision).

It makes sure that the quarry stones are lifted from one belt to the next higher belt before they fall off the belt.

Those stones which nevertheless fall off the belt (where REV's time estimates were wrong for a particular student and a particular item) are caught by ENFA, the Enforcer Algorithm, are entered into ERB, the Extraordinary Rendition Book and shipped straight to Guantanamo Bay, donde se habla Español, about which more later.

THE REVISION SCHEDULE: PRESENTATION 1

The first four revisions are as follows:

R0 Initial learning ends. Wait for 15 minutes.

R0 Revise. You will remember 90% or more, a triumph of your memory, and you need less than 5 minutes for this revision (and all later revisions, provided you stick to the intervals prescribed by REV). - Wait for 1 hour.

R0 Revise. Wait till before bedtime on the same day.

R0 Revise. Then go to sleep without any further distraction. What you have learnt will settle during the night, without you having to work at it, and, during your eight hours' sleep, no new information can displace what you have learnt during the day. The next revision will ideally be done first thing the following morning but may be done any time on this day.

R0 (Initial learning), R4, R5, ..., R11 will be entered into a REVISION DIARY. Make sure the diary you buy for this purpose has enough space.

R1 First thing the following day. Each revision will take only a minute or so, since you will make hardly any mistakes IF YOU FOLLOW THIS REVISION SCHEDULE. -- Then wait 2 days.

R2 Then wait 4 days.

R3 Then wait 1 week.

R4 Then wait 2 weeks.

R5 Then wait 1 month.

R6 Then wait 2 months.

R7 Then wait 4 months.

R8 Last programmed revision. Chain of artificial revisions (programmed revisions) ends here. Natural revisions and natural selection take over (see website, relevant chapter on "natural selection").

REVISION SCHEDULE: PRESENTATION 2

REVISION SCHEDULE IN BRIEF

Revise the current exercise (and each exercise) at exactly specified intervals, as follows:

- R0 = Initial Learning -

Then wait 15 minutes. Then revise again.

Then wait 1 hour. Then revise again.

All this is considered part of initial learning, leading to **SHORT TERM RETENTION**.

Voluntary revision: In the evening of the same day, before going to bed.

Example: e.g. R0 is on **1 May 2022**
Then wait till next day.

Note: R0 (Initial Learning) gives us short-term retention. The following revisions, R1 to R8, will give us long-term retention.

- R1 first thing the following day (e.g. **R1 is on 2 May, then wait for 2 days**). Each revision will take only a minute or so, since you will make hardly any mistakes IF YOU FOLLOW THIS REVISION SCHEDULE.
- R2 -- e.g. R2 is on 4 May, **then wait 4 days**.
- R3 -- e.g. R3 is on 8 May, **then wait 1 week**.
- R4 -- e.g. R4 is on 15 May, **then wait 2 weeks**.
- R5 -- e.g. R5 is on 29 May, **then wait 1 month**.
- R6 -- e.g. R6 is on 29 June, **then wait 2 months**.
- R7 -- e.g. R7 is on 29 August, **then wait 4 months**.
- R8 -- e.g. R8 is on 29 December

Chain of artificial revisions (programmed revisions) ends here. Natural revisions and natural selection take over (see relevant chapter on "natural selection").

Note: A **computer programme** could be created which calculates and prints out for each student the revisions which are due on any particularly day. But that requires money for the programme and

thorough testing. Right now, it is simpler to teach each student how to create his own revision diary and enter the revisions due on each day. For this purpose either printed diaries could be used, or blank diaries for each year could be created on a word processor and printed out for each student. The student then enters the revisions due by hand.

AMBULANCE AND INTENSIVE CARE

This applies at R4 and at all later revisions.

If the student makes **1, 2 or 3 mistakes** at R4 or later, these items are deemed to be "**difficult items**", and the student copies them into an "intensive care exercise". He then revises this exercise **daily** until it is full, i.e. until it contains ten items.

Once the exercise contains ten items, it is started on the standard revision schedule, namely the 8 revisions entered above.

If the student makes **4 or more mistakes** in an exercise, this exercise is deemed to be a "**difficult exercise**", and immediately starts another run of 8 revisions, as prescribed in the revision schedule.

REVISION DIARY

You will need a special diary to keep track of your revisions. This diary will turn out to be the best investment you have ever made.

On the appropriate date write the number of the exercise and the "revision level" (R1, R2, ...) into your REVISION DIARY.

For example, if on 14 March 2023 Revision R5 of Exercise 3 is due, write into your diary: "X3:R5+1m".

This means that this is Revision 9, and the next revision must be entered 1 month later. Writing down the revision level and the distance of the next revision helps you to keep track when writing the entries into your diary.

Entries in the REVISION DIARY always look like this:

Example: "Exercise 23" = X23

- X23:R0+1d
- X23:R1+2d
- X23:R2+4d
- X23:R3+1w
- X23:R4+2w
- X23:R5+1m
- X23:R6+2m
- X23:R7+4m

- X23:R8

The revisions after 15 and 60 minutes and in the evening of the first day need not be written into the REVISION DIARY. Their timing is easy enough to remember. They count as extensions of R0 (Initial learning). That is the reason why the preceding list says "R0+1d", which leads to R4, even though there are 3 revisions between R0 and R4.

Abbreviations:

- + 2d = plus 2 days
- + 2w = plus 2 weeks
- + 2m = plus 2 months

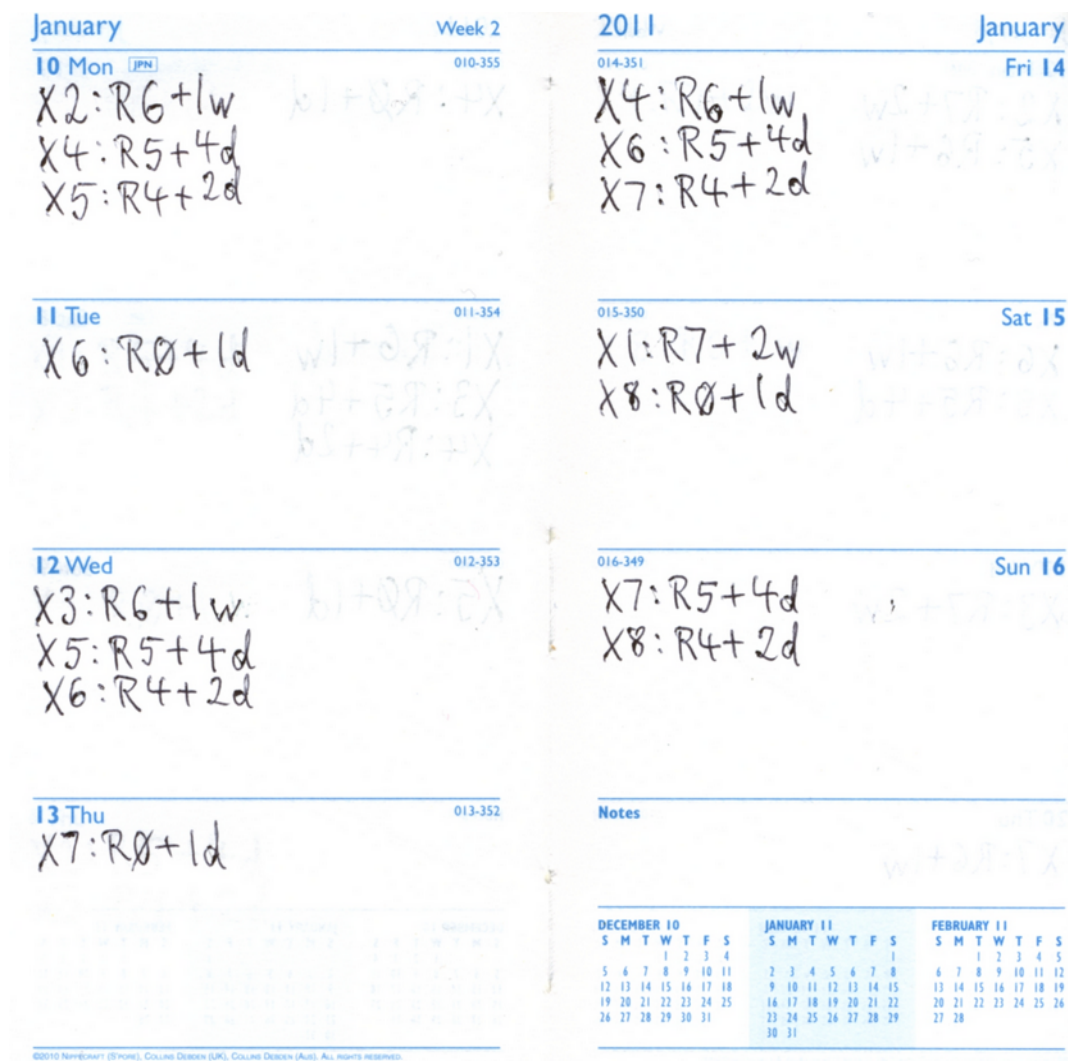


Image 20: REVISION DIARY

For the sake of absolute clarity, I will now give the exact dates on which Exercise 1 will be revised if started on 1 Jan 2011.

2011

- Sat, 1 Jan: X1:R0+1d
- Sun, 2 Jan: X1:R1+2d
- Tue, 4 Jan: X1:R2+4d
- Sat, 8 Jan: X1:R3+1w
- Sat, 15 Jan: X1:R4+2w
- Sat, 29 Jan: X1:R5+1m
- Mon, 28 Feb: X1:R6+2m
- Thu, 28 Apr: X1:R7+4m
- Sun, 28 Aug: X1:R8 # chain ends here

PRIORITIES

If you are short of time, the following rules apply:

- 1 Revision is more important than learning new material. If you skip revisions in order to learn new material, you will remember neither the old nor the new material. You will always be on slippery ground. You will never be confident. So you might as well learn little (the old material), but actually know it and be able to use it, rather than knowing nothing. Most people, when they say they "know" something, mean that they have heard it once, not that they can reproduce, explain or perform it. (Similarly teachers, regrettably, regularly say that they have "taught" something, when they mean that they have mentioned it in front of the class, not that their students "know it", i.e. have mastered it.)
- 2 The early revisions (R1, R2, R3 etc) are much more time-sensitive than the later revisions. Therefore if you delay R1 by 15 minutes (= 100%) you will make noticeably more mistakes (i.e. have forgotten more) than you will if you revise on time.

By contrast, a longer delay, e.g. two days, at R7 or R10 has less serious consequences. In the case of R7 a two-day delay is 29%, and in the case of R10 a two-day delay is 3%, whereas in case of R1 a delay of 15 minutes (i.e. revising after 30 minutes instead of after 15 minutes as prescribed) is 100%. The seriousness (in terms of forgetting) is equivalent to these percentages. A higher percentage of delay means a higher percentage of forgetting.

Therefore, if you have to postpone revisions because of shortage of time, delay the Revisions with high R-numbers (R11, R10, etc) rather than those with low R-numbers.

If you follow these instructions to the letter, your retention rate will be extremely high and you will make hardly any mistakes. Revision times will therefore be very short. It all

depends on the timing. A 100% delay does more harm than a 30% delay.

Your learning sequence should therefore be as follows, until your available time is exhausted:

1. Do overdue revisions (revisions due on previous days but not done), in sequence of R-numbers, i.e. R4 before R5 etc.
2. Do due revisions (revisions due on this day), in sequence of R-numbers, i.e. R4 before R5 etc.
3. Prepare new exercises and learn them.

ENFA, THE ENFORCER ALGORITHM

The theory of DYNAMIC LANGUAGE LEARNING accepts that one answer per exercise may turn out to be wrong when you revise. That corresponds to 90% retention, which is characteristic for the IDYLL METHOD. However, we want to keep more than we promise. There is a danger that these failing items accumulate over weeks and months. If you get an item wrong in Revision 7, then you are not likely to get it right during Revision 8 one month later.

Items which fail during Revision 7 and later are the most difficult. During your course of revisions you are gradually teasing out (filtering out) these most difficult items. ENFA, the Enforcer Algorithm, brings them to heel.

You will have at least two IDYLL workbooks, the ordinary workbook in which you keep the standard exercises described above, and ERB, the Extraordinary Rendition Book, which contains the most difficult items which you are determined to tame.

The IDYLL METHOD does not allow even a single item to slip through the net.

The general principle of DYNAMIC LANGUAGE LEARNING, and one of the reasons why it is called "dynamic", is the fact that the system adjusts itself dynamically to the performance of the learner. In PAPA, LASPEX and REV you observe that intervals are shortened when the learner makes mistakes and that they are increased when the learner gives correct answers, until he starts giving wrong answers (retention spans are too long), in which case the intervals are decreased until he starts giving correct answers and they are then increased again - until finally he has reached the desired retention span of four months for programmed revisions. At this point "natural revisions" take over.

REV increases the revision intervals, ENFA reduces them. REV and ENFA work in tandem to produce the dynamism of DYNAMIC LANGUAGE LEARNING.

ENFA comes into play at, and as from, Revision 4.

If you make one, two or three mistakes, you copy the failed items into ERB, the Extra-ordinary Rendition Book. Its format and the format of the exercises it contains are exactly the same as that of the Ordinary Workbook described above. The exercises in ERB are subject to REV. REV assigns 11 revisions to each exercise. Therefore the items entered in ERB are subject to 11 additional revisions, interspersed with the original chain of 11 revisions, i.e. the revision intervals have been shortened. This can happen repeatedly to the same item, i.e. the intervals are shortened ever more (just as much as required by this particular item and by this particular learner) until they become easy and unforgettable - which will inevitably happen when the time is ripe. There is no escaping it.

1, 2 or 3 mistakes in an exercise as from R4 are considered difficult items. If 4 or more items in an exercise are wrong as from R7, the whole exercise is deemed to be difficult and becomes subject to ENFA. (This rule avoids the need of copying many items into ERB.) Such an exercise will be treated as a new exercise and entered as such into the REVISION DIARY, i.e. the whole exercise will receive 11 additional revisions. This too can happen several times. Whatever you are trying to learn, you will eventually know it in your sleep. And it is not even hard to learn. It requires just a little common sense and orderliness, which will save you a lot of unnecessary work and, especially, a lot of frustration.

GENERAL REVISION

Learning a language with traditional methods, e.g. at school, is such a laborious and haphazard enterprise that forgetting it is a disaster. But that is the fate of most students who somehow and somewhat "succeed" in learning something of a foreign language at school. After three or more years of French at school, the best they can produce is "ça va".

The IDYLL METHOD makes provision even for wholesale forgetting of a language.

As an IDYLL learner, you can learn foreign languages, put them aside at will and press them back into service when you need them.

In a public library, if a book is not in constant demand, it will be stored in the "stack" or the basement and be brought up only if a user asks for it. Similarly if you do not need certain papers frequently, you archive them - like your accounts for the last 6 years.

In language learning two analogous situations can arise,

1 Long break

You have learnt a language for a certain purpose, with the IDYLL METHOD, of course, needed it regularly for a few years, but then changed jobs or moved to a different country. Instead of Spanish you needed Russian, or perhaps no foreign language at all. You forget your Spanish, or at least it gets rusty. Ten years later you are sent back to South America. You need your half-forgotten Spanish again.

2 Short break

A similar situation can arise when you have been learning a language with IDYLL for six months or a few years, and then because of external circumstances (illness, laziness, kidnapped by terrorists, or other reasons) have been unable to keep up with the prescribed revisions, in spite of all your good intentions. Inevitably you have forgotten much or most of what you had originally learnt. Your condition is similar to the person who has already achieved near competence in the language but forgotten it because he did not need it any more ("Long break").

WHAT HAPPENS IF YOU TRY TO RECOVER YOUR LANGUAGES WITHOUT THE IDYLL METHOD?

Your original textbooks look boring. You seem to know most of the contents, but not really. Doing the old textbook exercises looks like a waste of time. There is no point in running over the vocabulary lists, or the grammatical information in those books, because you simply know too much. The dialogues are deadly boring. They were more interesting first time round because at that time deciphering them and imitating them was a conquest, but now there is no achievement in reading them. At which chapter in the book should you start your revision. Wherever you start, it seems to be wrong, either too late in the book or too soon. Everywhere there are a few things which you do NOT know.

You have no way of telling what you know and what you have forgotten. Conversation with natives is riddled with mistakes, and there is no certainty of how and when to get rid of them. You are in a thorough mess.

GENERAL REVISION WITH THE IDYLL METHOD?

The IDYLL remedy for both situations it is the same. Its prescription is simple, effective and economical. It is called "General Revision".

Get out all your original IDYLL workbooks, presumably handwritten.

Do NOT quickly read over the contents of these exercises, otherwise you completely spoil the benefits of the IDYLL METHOD. and you will have to invest much more time into revising than would otherwise be necessary.

Get out your folding slip, and strictly test your knowledge of each IDYLL exercise, starting with Exercise 1. You MUST test in writing, as PAPA prescribes. But there is now a slight difference from the original PAPA procedure.

When you have made a mistake, you copy the correct answer, and you write the exercise number and the number of the wrong item on a separate piece of paper. You do NOT use the circle method, you do no folding and no going back over the same exercise.

What you are doing is simply an objective self-test. You are trying to identify the items which you have forgotten over the past 5, 10 or 20 years. And you want to finish this job of identification as quickly as possible for ALL your IDYLL exercises.

Learning will start only when you tested absolutely everything in your IDYLL workbooks. You will record even the smallest mistake, even if it is only an accent missing. Mistake is mistake.

So if in Exercise 3, you have items 4, 5, and 8 wrong. You write on your notepaper (not on the folding slip):

Ex. 3: 4, 5, 8

And so on for each exercise.

When your list of forgotten items is complete, you start a new IDYLL workbook, with new exercise numbers, e.g. B01, B02, etc (to distinguish this series of exercises from the original series, which perhaps was called X1, X2, etc). Then you copy all the forgotten items into this new workbook. It may be hundreds, or thousands. Just copy them.

Then give these new exercises the standard PAPA and REV treatment, combining it with SENTAL and the DIARY METHOD.

Don't rush. Be systematic and unemotional. Negative emotions (like fear, hurry, self-deprecation) are the greatest enemy of the traditional language learners. IDYLL is not only a wonderful method, it also works because you know that you can trust it, and that, instead of building up your emotions, all you have to do is what you are told by IDYLL, namely "Try the next item", "Copy the next item". Your calmness and confidence makes you an efficient learner.

I will now report a personal experience. Many decades ago I learnt Italian in a great hurry. Within a fortnight I learnt enough to be able to give a much applauded 30-minute lecture in very simple Italian based on a lecture script that I had written myself and that had then been tidied up and cleansed of

grammatical mistakes by native speakers. The text has since been published as Bung 1974.

I presumably continued learning after that for a while (enough to be able to read Manzoni), but I had no more need for Italian for several years, and let it drop. Some years later I had to return to Italy and needed the language. I went to an isolated little village near the Swiss-Italian border, with all my IDYLL notebooks. I spent an extended weekend there (Saturday, Sunday, Monday) working calmly and methodically from morning to night, like a bricklayer who knows his job. I knew the IDYLL METHOD. My bricks were the words and phrases in my workbooks. I knew that, if I plodded on diligently, I could build even the Chinese wall, to say nothing of an Italian one.

I did the General Revision described above and started activating what I had forgotten, much faster, of course, than my original learning. I then got onto the slowest train from Geneva to Milan that I could find. By the time I arrived in Milan, and then in Naples, having used countless hapless fellow passengers as unpaid teachers, I was pretty competent in Italian again.

Then, for thirty or forty years, I had no more need for Italian. So why keep it alive when there are more urgently needed languages to learn!

Just now, in order to get a concrete example of retention after a long time and how it feels to do a general revision out of the blue, I looked for my IDYLL workbooks again. For Italian I found ten of them. They contain a substantial amount of material, all taken from standard textbooks, some extremely old-fashioned, and converted into the IDYLL format. They are worth ten times their weight in gold, and so are YOUR workbooks. Your workbooks enable you to revive whatever language you have learnt, very efficiently and unemotionally, whenever you wish.

I picked Exercise 3 at random and the next illustration shows how well or how badly I did.

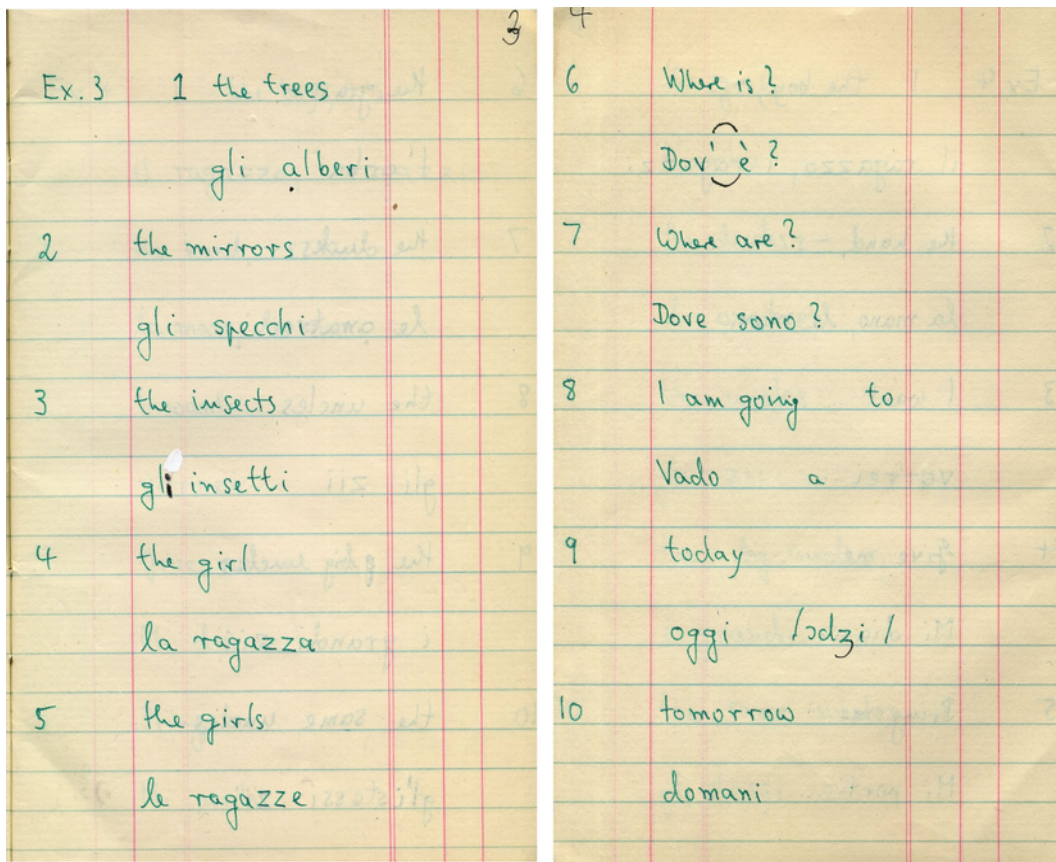


Image 21: Italian workbook

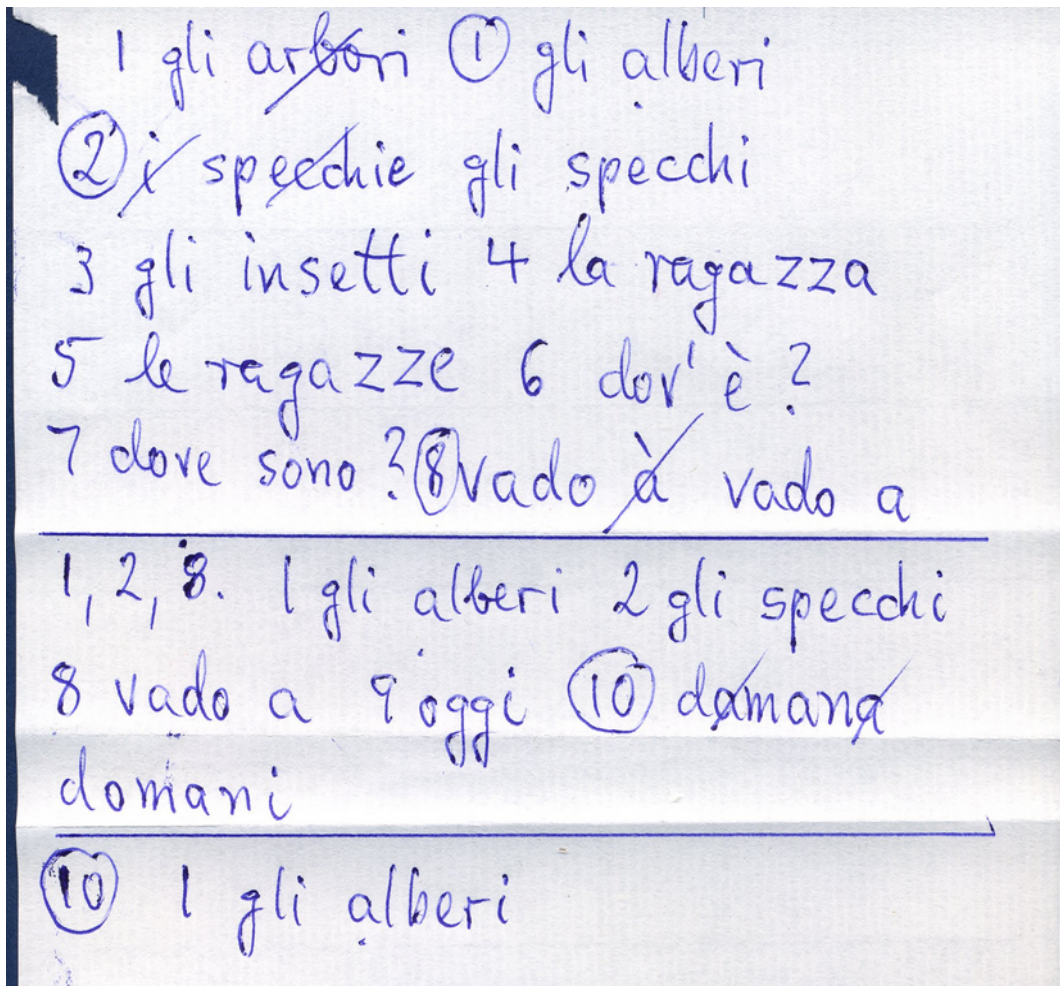


Image 22: Italian folding slip

This was, of course, an easy exercise. If it had been an exercise on irregular verbs or on hypothetical sentences (e.g. "If my aunt had wheels, she would be a bus; but she doesn't have wheels, therefore she is my aunt"), I would have done worse. But with those invaluable workbooks and with disciplined application of the IDYLL METHOD, I would have learnt all of this very quickly again. And so can you!

NON-ALGORITHMIC COMPONENTS OF THE IDYLL METHOD

We now summarise the non-algorithmic components of the IDYLL METHOD. Details of these components can be found on the website.

SENTAL: HOW TO ADAPT LANGUAGE ELEMENTS FOR YOUR PERSONAL USE

SENTAL, the Sentence Algorithm, enables you to eliminate vocabulary and grammar mistakes from your writing and test systematically how to use new words and idioms and where are the limits of validity.

You start by writing a few paragraphs on any subject ("seed sentences") and have them checked by your teacher or an informant (including a penfriend on the internet who knows your target language). When you make a mistake (any mistake), it is pointed out to you. Either you see immediately that and why it was wrong, or your informant explains it to you.

Your task now is, for any mistakes (even accidental ones), to compose three meaningful sentences which prove that you understand what has been explained and that you can avoid this mistake in future.

Gradually your writing will become error-free and you will increase the range of topics you can write (or talk) about, and you will increase your repertoire of vocabulary, idioms, grammatical structures, etc.

Your speaking ability will also improve because writing is a preparatory exercise for speaking on any topic. In writing you can try out at slow speed what you will have to produce in speech much more quickly.

It is also much easier for your informant to spot mistakes in your writing than in your speech. The mistakes that you make in speaking will also show up in your writing, and vice versa. Therefore it is always worthwhile to improve your writing. SENTAL is the ideal method in that respect. It is for intermediate and advanced students. Beginners should simply follow their textbook or course, and improve it by applying PAPA and LASPEX and REV to it.

Perhaps you are unhappy because you do not have anybody to whom to speak in your target language. In that case, writing emails, imaginary letters, diary entries, stories, compositions is an alternative which prepares you for the time when you have a live person to actually talk to. If you are a competent writer, you will also be more confident as a speaker and in conversation than you would be if you were an atrocious writer. Good and fluent (fast) writing is a precondition for fluent speaking. You cannot be a good speaker if you are bad writer. Usually you have many

more opportunities for writing than you have opportunities for speaking. Therefore, when you are without opportunities to speak (lack of a partner), simply improve your writing.

ENVIRONMENTAL LANGUAGE LEARNING

There are many different approaches to deciding what to teach at the very beginning of a foreign language course. Some courses start with dialogues, or with practical situations (how to buy something, ask directions etc), others start with grammar and vocabulary. The opening lessons of many traditional courses are determined by what is most useful in practical life and not by what is easiest to learn.

All approaches have their advantages and disadvantages, depending on the circumstances and objectives of each student. All approaches (however irrational or difficult) can benefit and be made more efficient if they are processed by the IDYLL algorithms. But none of these approaches makes the start in a foreign language as EASY as IDYLL's system of Environmental Language Learning (ELL).

ELL is a starter system for students who eventually want to become fully competent in a language and not only get by. It therefore does not matter to them in which sequence the language elements are taught. For them, the easiest sequence is better than the most "utilitarian" sequence. Such students, who want to learn the full language for its own sake, and whom we may call "general-purpose learners", are often neglected in current language courses. "An enquiry conducted by Richterich (unpublished) among the students of the Eurocentres in Switzerland shows that such students form the major part of the population investigated." (Bung 1973, p 22).

THE CONFLICTING REQUIREMENTS OF "EASE OF LEARNING" AS OPPOSED TO USEFULNESS

Any language element (word, grammatical rule, phrase, sentence fragment, sentence, etc) can be assigned a value indicating how easy it is to learn at a certain point in a course (a teaching sequence): the "ease-of-learning indicator". For any given language element, this value changes depending on its position in a teaching sequence. Something that is difficult at the beginning of a teaching sequence (because the necessary prior knowledge has not yet been created) may be easy in the middle or at the end of the teaching sequence.

It is one of the principles of programmed instruction that all language elements are placed into a position where they are "easy to learn" (Cartesian sequencing), i.e. where they are preceded by easier elements and followed by more difficult ones.

The same language element can also be assigned a value indicating its usefulness for a certain group of learners. There is no necessary correlation between "ease of learning" and usefulness.

There is pressure on teachers and course designers to teach first what is considered most useful in everyday situations (or to teach only what is most useful). The resulting teaching sequences do not necessarily agree with Cartesian sequencing, which maximises ease of learning. Sometimes the useful language functions are not easy to learn, and the easy language elements are not immediately useful.

It is fair to assume that foreign language learners at (secondary) schools and universities are "general-purpose" language learners, who are aiming at full competence in their chosen language and who not only want to "get by" with the smallest number of phrases, like a tourist, a Spanish waiter or an Indian taxi driver.

We must therefore ask whether, when balancing the positioning required by ease of learning against that required by usefulness, ease of learning should not have priority and useful situations and functions should not be postponed for as long as necessary to make them easy, i.e. until the foundations have been laid which make them easy. Everything is easy if taught at the right time and in the right sequence.

In a course trying to produce "fully" competent speakers of a language rather than walking phrase books, this kind of sequencing is possible. It makes learning easy and leads to triumphal success (a fully competent speaker). All it requires is a bit of patience on the part of the students and their teachers. Impatience, even though intended to increase motivation, can lead to frustration and failure.

MORE ON ENVIRONMENTAL LANGUAGE LEARNING

Environmental Language Learning has three objectives:

- to make the beginning easy
- to enable the student to practise the language all day long, even outside the classroom and even if he is not in the target country (e.g. in France for learning French, etc)
- to train the student to THINK in the foreign language, from the very start

This is the preferred (but not obligatory) initial approach of the IDYLL METHOD.

From the first lesson onward, the student learns very simple words, especially nouns and adjectives which enable him to describe aloud or mentally the environment in which he moves: colours, room, house, street, countryside, animals, foods, etc. Verbs, adverbs, interrogatives etc are gradually added to this stock depending on whether they are easy and have many

applications, rather than that a particular situation requires them. The situational approach, far from being fun, can make the language very hard and emotionally austere for the student.

ELL is largely descriptive (you describe your environment). The dialogue approach comes in the next stage. During the ELL stage, the descriptive stage, you have total freedom to select what you describe or not describe in your environment. You can therefore choose to learn what is linguistically easy and fits best with what you already know (domino approach). By contrast, you have no such freedom in the operational approach (pragmatic, dialogue, situation-based, needs-based), where the selection of language elements which must be taught is based on non-linguistic criteria, which can make learning unnecessarily difficult.

The fact that I need to master a phrase urgently does not necessarily make it easy to learn at that stage of my linguistic development. I have had some deadly experiences practising ill-prepared dialogue in needs-based classes. The secret of the IDYLL METHOD is that the student is well-PREPARED for every new task he tackles. That makes all tasks easy. Lack of preparedness makes even the easiest task difficult.

In Tagalog, the present tense is more difficult than the past and the present taken together. Example:

root:	sing	kanta	
future:	I shall sing	kakanta ako	(reduplication)
past:	I sang	<u>kum</u> anta ako	(infix)
present:	I sing	<u>kum</u> akanta ako	(infix in reduplication)

ELL makes sure that the student always SEES something that he can describe (aloud, or in his thoughts). The language elements (words, forms, constructions) are selected not by some non-linguistic operational (pragmatic) requirements (situation) but by grammatical criteria, the domino principle: We add what fits easily with what has already been learnt, what involves the smallest possible increment to what the student has already learnt. The student is constantly encouraged to process (mentally describe) the world he sees around him in terms of the language elements he knows. This leads to thinking in the foreign language. It makes the first stages of learning very easy. The student will feel confident and at home (embedded) in the concepts and sounds of the language by the time he has to tackle some more difficult structures and concepts and deal with situations in which he has to communicate.

HOW TO EXTEND AND ENRICH YOUR COMMAND OF THE LANGUAGE

Initially (usually for several years) a course book and a teacher will feed you with the language elements (words, idioms, and grammar information) you need to extend your command of the language. But a time will come when you are left to your own devices. Then this is what you will have to do:

- 1 Read in, and listen to, the language every day or at least every week. Reading is easier.
- 2 Select from your input (spoken or written language) new items which appear interesting or useful to you.
- 3 Assimilate them (make them your own) by applying PAPA and the IDYLL DIARY METHOD and SENTAL, described on the website.
- 4 Make sure you have several informants (language friends), perhaps online, who can explain things to you and tell you whether what you are writing or saying is right or wrong.
- 5 Daily or weekly reading ensures that your language is enriched (that you know more than before).
- 6 Use SENTAL systematically. This ensures that your mistakes are eliminated and your correctness increases.
- 7 If you do not, at least, read, your mastery of the language will remain stagnant, you will never make any progress

HOW TO FAIL A LANGUAGE EXAM

If you need to pass a certain exam for professional reasons, stop being obsessed with the exam (e.g. IELTS for people who want to be admitted to certain professions or courses of study in England). Do NOT ask (as many candidates wrongly persist in doing): "How do I pass that exam? How do I get better grades?" If that is the question you desperately ask and if your main goal is to pass that exam, you will never pass it, and you do not deserve to pass it. Moreover, our Institute will not want to help you. We do not want you as a student or a client. We help people who want to learn languages. We do not help people who merely want to pass exams.

There is only one simple answer to your ill-advised question: If you want to pass that exam, IMPROVE YOUR ENGLISH (or whatever language you have to learn). The kind of pre-professional students we meet again and again do not want to learn English (and do nothing serious towards that end), they only want that certificate, they want to enter that profession or that course of study.

IDYLL is offering all the techniques you need in order to improve your English. Apply them. That is all you have to do. Your language skills will improve, and when they are good enough you will pass that exam. At the moment you do not pass it because you do not deserve to pass it.

1. Sit down to study systematically. 1 hour per day is the absolute minimum, more is better.
2. Use the right methods: IDYLL offers you a full range of them. If you invest time for study but use the wrong methods, your time is wasted.
3. Be systematic and perfectionist. Pursue every mistake and eliminate it (SENTAL), collect new information persistently.
4. Seek informants (language partners) in the town in which you live and through the Internet. Do not say it is impossible to find English friends if you live and study in England. It may be difficult but you can find and befriend them. Never give up. Try 100 times or 1,000 times. If that is not enough, try 10,000 times. If you do not persist, you do not deserve to succeed.
5. When working with your informants, teach them the IDYLL methods and follow these methods systematically (i.e. without exception). Without these methods you will be wasting your time, even among native English (etc) speakers. Your English will not improve. They can NOT teach you English. You have to make an effort to LEARN from them, by applying the IDYLL methods (e.g. SENTAL, the DIARY METHOD, etc). Force your informants to help you in accordance with these methods. If you do, you will succeed. Moreover you will never run out of topics of conversation (as happens so often between Internet chat friends). You will always be able to talk about some aspect of language - until you are so perfect in the language that there is nothing to talk about any more.
6. If you are going to classes (especially intermediate and advanced classes), treat your teacher like an informant. He can NOT TEACH you the language even if he says he can.

Nobody can teach you, but you can and must LEARN. Note down every word, every idiom, every grammatical rule, every scrap of information he gives you and process it with the IDYLL METHOD.

You do NOT learn a language while you are in class. Most failing language students wrongly believe that they will learn while in class. That's a stupid idea and leads directly to failure.

Learning starts when you leave the classroom. Then it continues, OR SHOULD CONTINUE, until your next class, whose purpose it is to CHECK ON YOUR PROGRESS.

During the interval from one class to the next, you have to spend 8 hours a day to absorb, test and put into practice what you have been told during the class. That's when you work with your language friends.

Most students do not do this. They believe in a superstition, an old wives' tale, that they can learn a language in classes. That superstition leads to failure.

They believe that their teacher is bad or their language school is bad. This is not true. There are no bad teachers, there are only bad learners. If you are a good learner, you can learn even from the worst teacher.

You cannot change your teacher. If you blame your teacher, you will never succeed. If you blame yourself and change your behaviour as a student, you will succeed. IDYLL tells you exactly what to do.

7. Stop all activities except those which are part of your systematic language study (apart from cooking, eating, sleeping, going to work, and looking after your children). Maximise the time you spend studying. 8 hours per day is better than 1 hour per day. Most failing students do not do this. That's why they deserve to fail.

**THE DIARY METHOD:
HOW TO COMPENSATE FOR
THE LACK OF SPEAKING PARTNERS**

You have to practise the language, not only with formal exercises (e.g. the IDYLL algorithms), but also to express your own thoughts. Expressing your own thoughts (and understanding those of other people) is the ULTIMATE AIM OF LANGUAGE LEARNING. This ultimate goal subsumes all other activities which are practised in language classes: dialogues, speeches, debates, shopping, asking directions, writing letters and reports (or reading them), etc.

Many of the millions of language learners around the world do not have partners with whom to practise these skills. All they have is their teacher and their language classes, and these are never sufficient. Two or three hours of language practice per week are not enough to make reasonable progress.

Some language learners do not even have a class and a teacher.

This is what the IDYLL METHOD recommends:

1 Mental language practice

This is described in the website article on ELL: Environmental Language Learning. It works not only for beginners but for students at any level. This approach will not correct your mistakes, but it will keep your language alive and make you aware of short-comings (e.g. a word you need and don't know) and send you to the dictionary or an informant to get the answer.

2 Writing a diary

In your diary you can write anything you are capable of:

- Initially only isolated sentences which you have learnt: I get up. I go to sleep. I go to work. I am tired. I am happy. etc. (You can do this after a few days or weeks of learning the language.)
- Then more rounded descriptions of your day's activities.
- Then descriptions of your emotions, thoughts, fears, plans.
- Then descriptions of conversations you have had. (Your chance of practising dialogue, even if you do not have a speaking partner.)
- Then descriptions of imaginary conversations or imaginary events, things which might have happened but didn't.

You are now in the realms of fiction. No masterpieces are expected, but only an attempt to use your language correctly. The reason why IDYLL recommends fictional texts is not in order to make you do something challenging and difficult, but to make things easier for you. This gives you total freedom to write anything you want. It does not have to be true, it does not have to be in your life, it does not have to be coherent. It must merely be something that is easy for you with your present language skills.

To ensure correctness, use several informants (language friends). One informant does not have enough time to correct all your mistakes. There will be too many. Find these informants on the internet by searching patiently and systematically and cultivating your relationships. Use SENTAL to eliminate your mistakes. Teach SENTAL to your informant so that he/she knows what you are doing and how you are studying. You will then also have endless topics of conversation. With SENTAL an Internet relationship never becomes boring (as in practice it so often does). You will never run out of things to talk about. SENTAL therefore also helps you to create and maintain friendships.

HOW TO USE WRITING TO IMPROVE YOUR SPEAKING-FLUENCY

Among the many prejudices which prevent language learners from learning well and traditional language teachers from teaching successfully is the view that you learn speaking by speaking and not by writing, and that speaking is easier (or more natural) than writing and should therefore be taught first. This is not true.

VOCABULARY

When beginners learn the elements of language, e.g. vocabulary, writing is easier than speaking because written words can be analysed into letters, and correct written responses can be built up systematically letter by letter, whereas spoken responses can not be built up phoneme by phoneme. A learner who can write a word will, with the IDYLL METHOD, learn its pronunciation more quickly and more accurately than one who can not write this word.

As with all the varied tools which constitute the armoury of the IDYLL METHOD, the question is not whether any one tool leads the learner to the goal, but whether it moves him closer to the goal. This applies to all the techniques described in this book.

NB. It is, of course, easy to prove my assertions wrong by misusing the IDYLL METHOD, i.e. by NOT using it. My assertions apply only when seen in the context of well-practised IDYLL principles. Techniques must be compatible. You cannot prove that a Rolls-Royce engine is badly designed because it fails in a Skoda.

COMMUNICATION SKILLS

Many learners around the world, especially those learning English it seems, are frustrated by the fact that their speaking skills are not good enough and they do not have partners with whom to practise. In their obsession with the ultimate goal, speaking, they reject and ignore the many tools they could use to come closer to this goal.

The IDYLL METHOD was developed to do the best possible in ALL circumstances, including circumstances which are not ideal (in the classroom, for solitary learners, in the target country (e.g. in France for learners of French) or in the home country, with bad teachers and with good teachers or with no teachers, with native speakers as teachers and with non-native speakers as teachers, with adult students and with teenagers, etc). It therefore recommends carefully considered compromises, ways of getting around a problem, rather than insisting on unattainable ideals. It has rules for minimising the damage done if a learner, through lack of time, deviates from the REVISION DIARY,

by setting priorities for the various learning tasks which are part of the method.

For speaking skills the following principles apply:

- Writing is slower than speaking, writing is therefore easier than speaking and should be practised before speaking. (While writing, you have unlimited time to think, you can consult notes, a dictionary, a grammar.)
- If you cannot express something in writing, you can a fortiori not express it in speech.
- Therefore practise in writing (e.g. DIARY METHOD) whatever you want to say in conversations. Make yourself fit for speaking by practising writing.
- Write about the same topics again and again and gradually increase your writing speed. Target: To become a fluent writer. Express yourself as fast in writing as a fast touch typist.
- The fastest writing speed which is physiologically possible (limitations on your hand) is equivalent to the slowest speaking speed which is psychologically bearable for your conversation partner. (If you speak below that speed, you will drive your partner crazy and he will no longer be able to see the coherence of your sentences or arguments.)
- Increase your writing speed on a certain topic to its maximum. Then, starting with slow speaking speed, increase that speed to a natural level if or when you have a conversation partner.
- If you have no partner, practise writing until you find a partner.
- Do your best to search for a partner on the Internet. Then use Skype for conversation practice.
- Do not refuse, as so many goal-obsessed language learners do, opportunities to practise writing (DIARY METHOD) with or without a partner because what you really want is conversation. Result: You learn nothing at all. If do writing practice, you will learn at least something.
- Self-confidence: Many intermediate and advanced language learners are complaining about lacking self-confidence. They insist on a conversation partner and reject any help that is offered with their writing skills, especially SENTAL. By going for all or nothing, instead of compromising and accepting writing help as a second-best option, they gain nothing. If they could write fluently and competently, they would gain the confidence they need for speaking.
- Writing practice must accompany conversation practice. Even if you have a conversation partner, conversation alone is not sufficient. I know people who have been chatting with me or others on the net for years and never made any progress. Their English is still as broken and idiosyncratic as it always was, (in fact I am now enjoying their creative use of English, e.g. the compliment: "Your English is good then BBC") because they have the IDIOTIC belief that, simply by speaking, their English will become better. It will not.

These people will remain unemployable (in English) forever. Some goal-obsessed teachers who detest linguistic analysis and synthesis are partly responsible for this. The IDYLL METHOD is not attempting to bring you miraculously straight to the goal. It brings you safely, step by step, NEARER TO the goal.

- You do not learn conversation by conversing. You only learn it by using conversation with a partner in order to come to grips with the elements of the language. "Coming to grips" means using writing to look at the elements of the language and assimilate them systematically, using the array of tools offered by the IDYLL METHOD. Many students with whom I work on the Internet do not do this. They will remain forever incompetent. They think chatting is fun, so they chat, but learn nothing.

THE RED RAG BRIGADE

Many language teachers and their trainers are allergic to certain unfashionable terms, e.g. vocabulary, grammar, translation. They say: "We do not teach vocabulary", "We do not teach grammar", "We do not use translation," claiming that all these things are boring, useless, lead to mistakes, or make life difficult for the learner.

None of these assertions are true. In order to communicate, you must create and understand sentences. To create sentences, you need words. To bind the words together, you need grammar. The only thing that requires discussion is HOW you would teach words and grammar, but not WHETHER they need to be taught and learnt.

Knowing grammar does not necessarily mean (as the critics of grammar learning and teaching seem to suggest) reciting declension and conjugation tables. Only a malicious person, or a person blinded by prejudice, would interpret the claim that students need grammar to mean that they will be made to recite tables or study dense grammatical rules without context and appreciation. Yet, some teachers have these allergies.

They throw the baby out with the bath water. Instead of saying that grammar should be taught well and used well, they say that it should not be used at all.

Similar considerations apply to vocabulary. Some teachers proudly abolish vocabulary learning instead of teaching vocabulary well: baby - bathwater.

I have seen clueless children guessing their way through ill-conceived published worksheets (as part of their homework), knowing hardly any of the words used and giving random answers. Well planned IDYLL vocabulary work would have put these children to the top of their class and beyond, and made them perform better during role-play exercises as well. The anti-vocabulary prejudice of their teachers will turn them into failures.

Similar considerations apply to translation exercises and use of the native language, whose prohibition is another ill-conceived dogma which harms language learners, and especially children.

It is not true that speaking can be learnt better and faster if use of the native language (e.g. English, when English children learn French, German or Spanish) is banned from the classroom, on the spurious grounds that you learn best if you hear nothing but the target language around you, i.e. that using the native language is harmful. On the contrary, incessant use of the target language is harmful and wasteful if the learners do not understand, for long periods of time, what is being said and do not understand what is happening grammatically.

Using the native language is harmful only if it is used exclusively throughout a lesson so that the pupils never hear and speak the language they are learning.

However, this is not the only way of using translation and native language. It is, in fact, ABuse.

Translation techniques and native language should be intelligently used, as the IDYLL METHOD specifies; but they should not be banished altogether. By doing so, the teacher deprives himself of a valuable tool.

Insisting on not using the native language (e.g. English while in England) can lead to a great waste of time and to unnecessary misunderstandings. If English had been used intelligently, a lot of time could have been saved and become available for a role-play and teaching language use. Prohibiting native language explanation and translation can be positively harmful.

I have seen published French worksheets, given as homework, based on the ill-conceived notion that pictures are always better than words (and translation), and that the native language (e.g. English) has to be avoided at all costs.

On this worksheet, words and pictures had to be matched (to avoid the translation of vocabulary). The tiny monochrome drawings (in themselves expensive to produce) were ambiguous or meaningless. The pupil, who did not know any of the words, matched French "magasin" (shop) with a picture of a book (intended to be matched with "bibliothèque" (library)). She mistakenly believed that French "magasin" (shop) was the same as English "magazine" (news magazine). There were several buildings and any of them could have been "shop".

Some respect for the importance of "vocabulary", and the use of some IDYLL exercises, would have enabled the pupils to master not only the distinction between English "magazine" and French "magasin" but also all the other words occurring on that worksheet (about 20 of them) and insured intelligent responses to this worksheet, however silly its basic conception may have been.

But if an educator refuses to recognise the various skills involved in knowing the meaning of foreign words and the various uses to which they can be put, in conversation, written expression and dealing with silly worksheets, children are bound to fail -- not because of their lack of talent but because of ill considered teaching methods.

The use of such materials because of an ignorant anti-vocabulary and anti-translation prejudice is a waste of time and a form of intellectual child abuse. If such children fail in their GCSE's and never make it to 'O'-level and 'A'-level, it is plainly the fault of their blind and prejudiced teachers.

The IDYLL METHOD would have handled this problem with the ease and could lead many children to success. They are at present, by their teachers, condemned to failure.

I attended a Hindi class for adults. It started with fourteen students and finished with three. The teacher wisely never attempted to use the direct method (speaking Hindi only), in which case she would never have even "covered" the syllabus for the three students who survived the course.

But she had obviously been trained not to use translation, i.e. not to establish an equivalence between English and Hindi expressions. As a result she would, in all good faith, waste time by giving laborious and hard to understand explanations such as the following: "If you have a person and you want to say that something belongs to that person, then in Hindi we have the word 'ka' and you put it after the name of the person that the thing belongs to."

This or something worse was the explanation actually given (and there were more of this kind in other lessons). The teacher was faithful to his training. She did not use translation and she did not use grammar, or grammatical terms. She did not speak about prepositions, postpositions, possessive particles, the genitive case, etc. But even though her explanation lasted for only five minutes,

- it was a waste of time, which could have been better spent on an IDYLL exercise,
- it utterly confused the students and contributed to the wrong impression that Hindi is a difficult language
- it missed an opportunity to make an easy concept crystal clear
- and it deprived the students from the opportunity to generalise from this example.

The explanation, à la IDYLL, should have been:

1. 'ka' corresponds to English 'of'; e.g.
aap = you, aap ka = of you = your
2. English prepositions come before their nouns.
3. The corresponding words in Hindi come after the nouns and are therefore called "postpositions".
4. 'ka' is a postposition.
5. aap ka (you of) = of you = your
6. the car = gari, of the car = gari ka, the car's door = gari ka darvasa

Examples:

- The girl's father = larki ka pita
- The door of the room = kamra ka darvasa
- Your book = aap ka kitab
- Your chair = aap ka kursi
- etc

Then an IDYLL exercise would have been provided immunising the students against native-language interference (one of the great worries of the anti-translation lobby), to ensure that they put the 'ka' after the noun and not before, as in English.

By letting them practise a sufficient number of contrasting examples, it will never occur to the students, not in their wildest dreams, to use the English structure instead of the Hindi one.

The avoidance of translation and contrasting practice causes the very problems which certain dogmatists claim to prevent. No wonder so many language learners fail and so many schools fail in foreign language teaching.

TRAM: HOW TO IMPROVE YOUR LISTENING SKILLS

Many students complain that they cannot understand English when it is spoken fast, e.g. in the street or on the radio. They can understand their teacher in class because he speaks at a slow speed, articulates carefully and uses only language which he knows his students will understand.

Endless listening to people in the street or on the radio or in lectures will produce little progress. It usually means endless frustration. There is no record of success or failure (because this is done entirely orally), and no record of progress.

Obviously the student will try to learn from his teacher some of the principles of pronunciation, e.g. the weak syllables in English, or "wouldn't" instead of "would not", or, alas, "wanna" instead of "want to", or, alack alas, "gonna" instead of "going to", etc. But this will presumably not be sufficient.

TRAM, IDYLL's Transcription Method, works as follows:

1. The learner obtains some recorded speech (say 5 or 10 minutes), most easily taken from the radio, and saves it as an mp3 file.
2. He now tries to write down in pencil what he hears, and listens to to the same short stretch of speech, perhaps only a few seconds, again and again. Each time he listens again, he improves his transcription, fills in earlier gaps etc.

Full details of the procedure are on the website.

This helps the learner to concentrate on very short bits of speech. He can listen repeatedly (which he cannot do when he has a radio broadcast or a live conversation). He can ask native speakers (even over the Internet) for help. His progress will become visible.

HOW TO USE INTERNET PENFRIENDS FOR LANGUAGE LEARNING

In most reasonably sized towns in Europe and America these days, you can find native speakers of almost any language under the sun, especially the more popular ones which probably you want to learn. Try to find them, and then befriend them. If you have mastered the IDYLLMETHOD, you can learn a lot from them, since as native speakers they can tell you what is right and what is wrong in their language. They will be indispensable when you use SENTAL and TRAM. To learn a language properly, you need much more time with a language partner than the teacher can give you in class, and a private teacher can be prohibitively expensive if you take as many lessons as you need.

Do not say it is impossible to find such people or to befriend them. In many cases you simply have to be more persistent, more inventive and simply nicer in order to be successful.

The Internet and social networking sites, e-mail and instant messenger (e.g. MSN) make it possible for you to meet language partners from all over the world and in any country under the sun.

Again you have to be skilful and persistent to find potential partners (people who speak your target language as their native language). Having found them, you have to cultivate the relationship and befriend them. For example, you have to turn Facebook friends (who tend to be just names) into real friends, people who enjoy talking to you, in whatever language, and who would be sorry if you disappeared from their lives. Don't think initially so much about what you can get from them, but find out what you can do for them, so that they value you.

Your main options for interacting with your Internet partners are e-mail, MSN and Skype. All have their advantages and disadvantages. I find that MSN, even if you do not like it, is essential to keep a relationship going. You see people come on-line, you can send them a Hi and, if they have time, chat with them. You can log your chats and if they have given you some new words or phrases, you can copy these from your chat log later on. The conversation will, of course, be disjointed, because their answer to a question of yours will arrive often only after you have already sent another question or some statement. You have to compensate for this.

The main advantage of MSN is that you will meet people more frequently and that small talk and banter is possible, which often does not make sense on e-mail. This helps to solidify a friendship and keep it alive.

Banter is useful for language learning even if you are an absolutely beginner. Let's assume you are learning Telugu (absolute beginner) and your partner is intermediate or advanced in English. Most of the chat can be conducted in English. You correct your partner's mistakes when the occasion arises, but you throw the odd Telugu word into your English chat whenever you think of a way of bringing it in, however forced or unnatural it may be. Gradually increase your Telugu inserts until you bring in a complete sentence. Occasionally ask your partner to give you a new Telugu word, learn it with PAPA and start using it. This is something that works only with MSN, where you get immediate responses, it makes little sense in e-mail, and in Skype, if you use a Telugu word where your partner is expecting an English one, your partner might not even understand what you are saying. So the language-mixing/code-switching technique is best for MSN.

The disadvantage of e-mail is that people might not open their email daily, that they might not be in the mood to respond, and that weeks can pass before you get a reply to what you have

written or the questions you have asked. And then reply may be inadequate.

The advantage of e-mail is that you and your partner have time to think about what you have written, to analyse your mistakes and send well-considered corrections, especially if you send some continuous prose rather isolated sentences as in MSN. This is even more true of e-mail attachments, where you could send a doc file with two columns, containing your own text in one column and the corrections in the other.

All this takes time and thought which you do not have when you use MSN. So you might want to combine email and MSN and use each for its own particular purpose.

Skype enables you to speak to your partner and have your pronunciation heard and corrected, and gain fluency. Speech, however, is not so useful for error-correction (as explained elsewhere in this book). As long as you make yourself understood, your partner will often not correct mistakes either because he does not notice them, or the conversation has moved on by the time he has noticed, and he does not want to interrupt the flow of argument. The same applies to both partners, no matter whether they are learning or "teaching". Therefore oral work with Skype has to be complemented by work with e-mail (e.g. for SENTAL) and with MSN, to get the relationship going and keep it alive, warm and friendly.

I find with many language learners on the Internet that they do not seem to be using books (e.g. textbooks), thinking that a language partner can "teach" them the language just by chatting. This is just wishful thinking. If you want to learn successfully from Internet partners, you must have textbooks and reference works, such as dictionary and grammar, and you must use these regularly.

I also find that intermediate and advanced language learners on the web often go around in circles and do not make any real progress for years. Just mentally noting my corrections will not make them better speakers or writers of English. To make progress there must be momentum and a steady speed. The IDYLL techniques provide this. Therefore I re-iterate for the Internet partners what I have said elsewhere in this book.

At any one time, one partner is learner and the other is informant (if they are learning each other's languages). Whatever I said about learning efficiently from a teacher applies also to informants (teachers by another name).

- Whenever you learn a new word or phrase, write it down and check it in your dictionary or grammar.
- Apply PAPA, REV and ENFA.
- Assimilate it by using SENTAL and the DIARY METHOD, and let your partner check what you produce under the SENTAL rules.
- Feed it back to your partner in normal conversation (or correspondence) until it becomes second nature to you.

If you do that, you can measure your progress. If you don't, you will simply continue forever at some intermediate or lower advanced level. I find that many Internet learners whom I have met fail in this respect. They have no persistent drive forward.

I often hear that Internet language partnerships peter out because the partners have run out of topics of conversation unless they are very much on the same wavelength and become very close friends. Initially they will ask each other about their studies, their job, their family, their friends, their country. After a while there is nothing to be asked any more, and the relationship becomes boring. It peters out, and both parties are disappointed.

However, if you use SENTAL there is always something to talk about, namely language. Your partner does not have to know SENTAL. It is enough if YOU do.

Encourage your partner to correct your mistakes. Then, without being told by him, produce the three sample sentences, e-mail them to your partner and ask him to check them and to explain your mistakes where necessary. Invent the three SENTAL sentences resulting from that. Etc etc. As long as you are making mistakes, which you will (thank God, or alas) for a long time to come, you will have topics of conversation, and you and your partner will be busy exchanging messages.

You could also teach your partner the other elements of the IDYLL METHOD, and he or she (!) will be eternally grateful to you.

MOST IMPORTANT: INVEST TIME

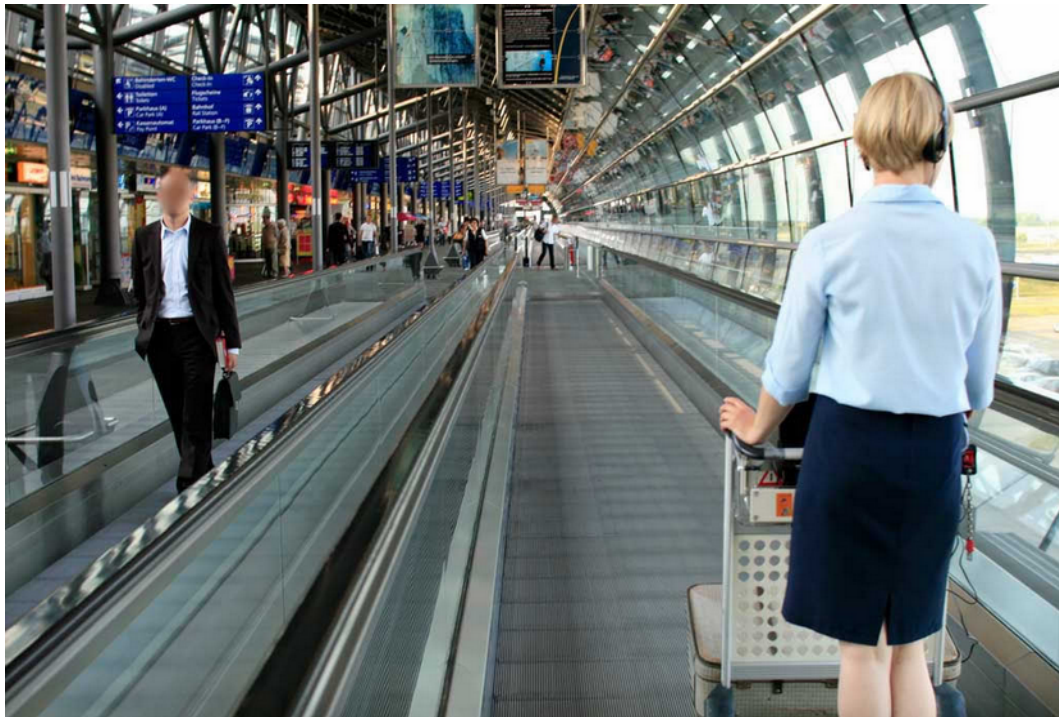
This may sound like a truism, but many people ignore it. It therefore has to be stated as if it were the most profound insight imaginable. If you do not spend time on language learning, you will learn nothing.

How much you learn and how quickly you learn depends on only three factors:

- 1 how much time you spend learning
- 2 whether, during that time, you use the right methods
- 3 and whether you sit down to study at the right time

The IDYLL METHOD requires you to spend at least 15 minutes every day. If you do not do that, the method will fail. That is not a weakness of the IDYLL METHOD but it is a law of human memory, like in physics that an apple falls if you release it. The IDYLL METHOD is simply pointing this out to you. These 15 minutes are required to ensure that you do not forget what you have previously learnt.

If you want to make progress (know more and make fewer mistakes) it is advisable that you spend more than 15 minutes a day, e.g. one hour.



Consider the following analogies:

- 1 If you want to walk from Lancaster to London, you have to get up every morning and put in a few hours of solid walking every day. Otherwise you will never reach your goal. You have to push ahead persistently every day. If you stay in bed, or watch telly instead of walking, you will never get to London.
- 2 As a language learner you are on a travelator which moves in the opposite direction from the one in which you want to travel. If you want to remain where you are, you have to walk ahead at the same speed at which the travelator moves against you. This is equivalent to doing, at the least, all your prescribed revisions. If you do not revise, you will forget. You are moving backwards. Doing your revisions means that you will at least stand still.
 "Hold that fast which thou hast, that no man take thy crown" (Revelation 3:11) and "Drum greift zu und haltet fest, wer greifen und halten kann! Faule Hände müssen ein böses Jahr

haben." (Take as much as you can and hold on to it, all you who can take and hold: lazy hands must have a bad year)
(Martin Luther)

- 3 If you want to make progress in your language, you have to walk ahead at a speed which is faster than the travelator which moves against you. You have to find new language elements and assimilate and practise them.

The IDYLL METHOD

Part 3:

The exercise format: Examples

PART 3 THE EXERCISE FORMAT; SAMPLE EXERCISES

GERMAN VOCABULARY FOR ENGLISH LEARNERS**Exercise 1**

1. the bed
das Bett /das bet/
2. the house
das Haus /das haus/
3. the glass
das Glas /das gla:s/
4. the grass
das Gras /das gRa:s/
5. the lamb
das Lamm /das lam/
6. the land, the country
das Land /das lant/
7. the child
das Kind /das kint/
8. the water
das Wasser /das 'vase/
9. the weather
das Wetter /das 'vete/
10. the car
das Auto /das 'ʔauto:/

This can be treated as a multi-stranded exercise, i.e. several exercises packed into one. If the student is to learn the difference between German and English spelling and pronunciation, it can be helpful to make him practise the IPA. If this is desired, the burden is eased by making him learn each strand of the exercise separately (applying all the rules of PAPA and LASPEX to one strand before turning to the next strand).

BEGINNING ENGLISH FOR SPEAKERS OF SLOVAK

Imagine Roma children with good knowledge of Slovak arriving in an English school.

^Exercise 1

1. Postav sa!

Get up!

2. Sadni si!

Sit down!

3. Pod' sem!

Come!

4. Chod'!

Go!

5. Čítaj!

Read!

6. Píš!

Write!

7. Opýtaj sa!

Ask!

8. Odpovedz!

Answer!

9. Kde?

Where?

10. toaleta

the toilet

Note: There are no definite and indefinite articles in Slovak. Ask your teacher.

Note: "toilet" is the most important word in any foreign language.

This kind of exercise can also be used for practising spelling with more advanced students.

Exercise 2

1. Kde je toaleta?
Where is the toilet?
2. dom
the house
3. izba
the room
4. dvere
the door
5. Kde je dvere?
Where is the door?
6. škola
the school
7. trieda
the classroom
8. môj, moja, moje
my
9. Kde moja trieda?
Where is my classroom?
10. okno
the window

^Exercise 3

1. stena
the wall
2. biela
white
3. Stena je biela.
The wall is white.
4. papier
the paper
5. Papier je biely.
The paper is white.
6. stôl
the table
7. stolička
the chair
8. Kde je stôl?
Where is the table?
9. Kde je stolička?
Where is the chair?
10. čierny
black

^Exercise 4

1. môj stôl
my table
2. moja stolička
my chair
3. Moja stolička je čierna.
My chair is black.
4. Kde moja stolička?
Where is my chair?
5. tabuľa
the board
6. biela tabuľa
the whiteboard
7. Kde je biela tabuľa?
Where is the whiteboard?
8. etc

In the same way, very carefully sequenced, the following words can be arranged and learnt. Very gradually short sentences and their grammar can be introduced. The student begins by exploring his classroom environment. Every exercise has to be practised until it is 100% correct, including every detail of spelling and punctuation.

Each exercise has to be revised on the prescribed dates. Each revision is also a test. On each revision date the exercise has to be practised until the student has it 100% correct, i.e. 10 correct answers without a single mistake.

By having a carefully planned sequences of such exercises (as opposed to the randomly selected and utterly useless "doable" work sheets), a large reliable body of knowledge can gradually be accumulated and give the student a feeling of success and self-worth: first 10 words, then 20, then 50, then 100, 200, 500, 1,000, 5,000 and so on. Step by step it can be achieved and **success can be guaranteed.**

pencil = ceruzka
pen (biro) = pero
book = kniha
notebook = notebook = prenosný počítač
teacher (m) = učiteľ
teacher (f) = učiteľka
pupil (m) = žiak
pupil (f) = žiačka
man = muž
woman = žena
boy = chlapec
girl = dievča

large = veľký (m)
small = malý
hot = horúci
cold = studený
white = biely
black = čierny
blue = modrý
red = červený
yellow = žltý
green = zelený
brown = hnedý
These are adjectives for masculine.

Blood is red. = Krv je červená.
Tomatoes are red. = Paradajky sú červené.
Butter is yellow. = Maslo je žlté.
Snow is white. = Sneh je biely.
Coal is black. = Uhlie je čierne.
Grass is green. = Tráva je zelená.
The sky is blue. Obloha je modrá.
Fire is hot. = Oheň je horúci.
Ice is cold. = Ľad je studený.
Elephants are large. = Sloni sú veľké.
Mice are small. = Myši sú malé.

Similar exercises can be constructed where the students have to translate **Romani words and sentences** into English (or any other language they want to learn, e.g. French and Spanish).

The same format can also be used for learning and practising factual information.

The teacher might always enter his classroom with a printed exercise sheet (catechism) containing the **absolute minimum** he wants even the slowest of his students to understand, learn and remember. The students could be given these sheets before the lesson starts as an aid to concentration. They could be encouraged to practise the questions and answers under their own steam using the METAL techniques.

SPANISH FOR GERMAN LEARNERS

<p>Übung 1</p> <p>1 Papierkorb el cesto</p> <p>2 etwa Mitte Dezember a mediados de diciembre</p> <p>3 die Kartause la cartuja</p> <p>4 die herbstliche Sonne el sol otoñal</p>	<p>5 der Mönch el monje</p> <p>6 der Laie el lego</p> <p>7 der Konvertit (=Jude od. Araber) el converso</p> <p>8 sogar, noch aun</p> <p>9 wohnen, hausen morar</p>
<p>10 der Chor (mus. = arch.) el coro</p> <p>Übung 2</p> <p>1 die (lange) Wachskerze, Altarkerze el cirio</p> <p>2 die Kerze (v-) la vela</p> <p>3 mit halb abgebrannten Wachskerzen con cirios a medio consumir</p>	<p>4 auslöschen apagar</p> <p>5 der Weihrauch el incienso</p> <p>6 binden, festbinden atar</p> <p>7 Burg = maurisches Schloß el alcázar</p> <p>8 r Falke el halcón</p>

Image 23 and 24: Spanish for German learners

Not every exercise has to start on a fresh page.

ARABIC VOCABULARY FOR ENGLISH LEARNERS

Ex 3			
1 rabbit		6 fox	
'Parnab (m) أرنب		'θaʕlab (m) ثعلب	
2 lion		7 camel	
'Pasad (m) أسد		'dzamal (m) جمل	
3 duck		8 carrot	
'bata (f) بطّة		'dzazara (f) جزر	
4 apple		9 horse	
'tafah (f) تفاح		ha'sain (m) حصان	
5 dress		10 fish, whale	
θaub (m) ثوب		huit (m) حوت	

Image 25: Arabic vocabulary for English learners; multi-stranded exercise

This is a multi-stranded exercise, several exercises packed into one. It is mandatory that the student tackles each strand in a multi-stranded exercise separately. In this exercise he will first master the nouns (without genders and Arabic script) using PAPA and giving his responses in IPA only. Then he will do the same with LASPEX. Then he will learn the genders through PAPA. Then he practises writing the nouns in Arabic script. He will continue this until his familiarity with the language and his fluency in the script reaches a level in which the main exercise is done in Arabic script only and the IPA is only on the periphery, to clarify the vowels, which are not always written in Arabic.

By dividing the different skills to be practised, the student is not impeded by the script when he does not yet know the sounds of the words (unlike an Arab child when learning to read and write). The presence of the IPA in addition to the recording makes sure that they student knows what to aim at even if he is still unable

to pronounce or even distinguish, say, the voiceless pharyngeal fricative /ħ/, the voiceless uvular fricative /χ/ (Scottish loch) or the voiceless glottal fricative /h/ (plain English "h"). It is also indispensable to enable him to articulate sounds which are easy to produce for, e.g., an English speaker but often difficult to distinguish on sound recordings, e.g. the /ʃ/ ("shame"). /θ/ ("thick") and /f/ ("fool"), especially in final position. The student can also run through the whole course and ignore the Arabic script entirely if he wishes. By treating the genders (m, f) as a separate strand, the student is not burdened with this feature while he is still trying to learn the basic sounds of each word.

ARABIC SCRIPT: INDIVIDUAL LETTERS

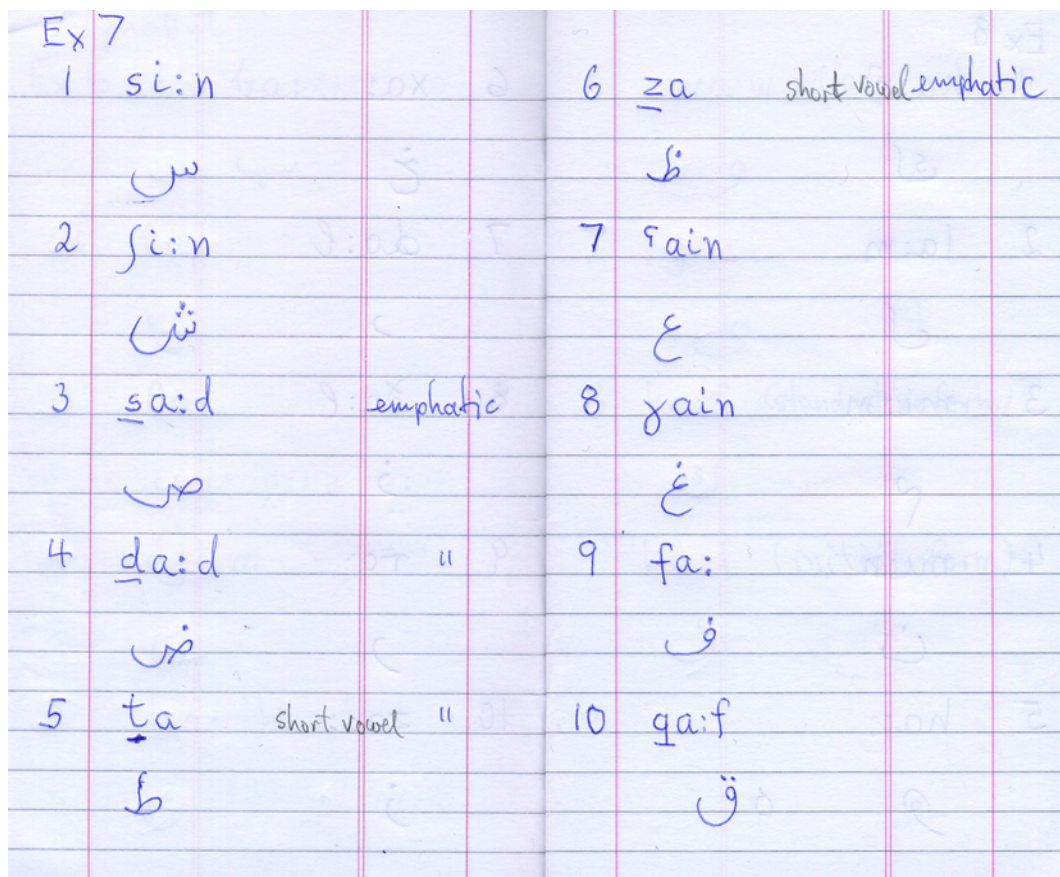


Image 26: Arabic script: IPA into Arabic

In this exercise, individual letters of the Arabic alphabet (stand-alone form) are being practised. The prompts are given in IPA, which is always recommended rather than the host of ad-hoc transcriptions based on haphazard English mispronunciations. An exception is Sanskrit and related languages for which a well-thought-out and universally accepted academic system of transliteration exists, which, in this case, is more helpful than IPA. Learning to COPY the characters would be part of "quarry

work", learning to write them in response to an IPA prompt corresponds to work on the conveyor belts.

The direction can be reversed: Learning to READ Arabic characters:

IPA INTO ARABIC SCRIPT

Ex. 9 Alphabet: Ar → IPA

1	ا	alif	6	ح	ha:
2	ب	ba:	7	خ	xa:
3	ت	ta:	8	د	da:l
4	ث	θa:	9	ذ	ða:l
5	ج	dʒi:m	10	ر	ra:

Image 27: Arabic script into IPA

ARABIC SCRIPT: COMPARISON OF SOUNDS

Ex 15 Alphabet Comparisons			
1	ṭa:l	ṭa:	
	ط	ث	
2	ta: da:l	da:d	
	ت د	ذ <small>dad with the dot</small>	
3	ha: ha:	xa:	
	ه ح	خ	
4	za: za	si:n	sa:d
	ز ظ	س ص	
5	ta: ta		
	ت ط		
6	fa: wa:w		
	ف و		
7	xa: yain		
	خ غ		
8	ka:f ga:f		
	ك ق		

Image 28: Arabic alphabet: comparison of sounds

In this exercise, the student is made aware of related sounds represented by the strange characters he has learnt: voiced/voiceless, emphatic/non-emphatic.

While many IDYLL exercises are such that the student can easily write them out for himself, from arbitrary and even bad textbooks and from the lessons of non-co-operative teachers, this kind of exercise is something that the TEACHER has to prepare because it requires some linguistic awareness.

Even random exercises (vocabulary, grammar elements etc) can be very helpful, and often no more than random arrangement and adherence to the underlying textbook can be expected. But sometimes insightful content and arrangement of items in combination with the IDYLL algorithms is possible and can be supremely effective, rather than either insightful content or effective learning algorithms alone.

SANSKRIT: DEVANAGARI SCRIPT

Another example of insightful content and arrangement is Klaus Bung's programmed approach to the teaching of the Sanskrit alphabet, found on the IDYLL website.

From Klaus Bung, "The Sanskrit Script: A Programmed Primer" (The Keyword Method) © 1988, 2011 Klaus Bung

Exercise 1

- 1 The sacred syllable OM

ॐ

- 2 r, ra

र

- 3 ā (within a word)

ा

- 4 m, ma

म

- 5 ḥ (final), also called visarga

ः

6 The god Rama: rāmaḥ

रामः

7 k

क

8 desire: kāmāḥ

कामः

9 t

त

10 star: tāṛā

तारा

Exercise 2

1 n, na

न

2 honour, salutation: namaḥ

नमः

3 mind: manaḥ

मनः

4 j = IPA /dʒ/

ज

5 man, person: janaḥ

जनः

6 g, ga

ग

7 elephant: gajāḥ

गजः

8 virāma, vowel stopper

्

9 song: gānam

गानम्

10 d, da

ढ , leading to dānam (gift, present), etc etc

Note: Once "Rama", the first word, has been mastered, only one new letter per word is introduced. The full manuscript contains an introduction and notes after each item, explaining the new features.

TAGALOG VOCABULARY

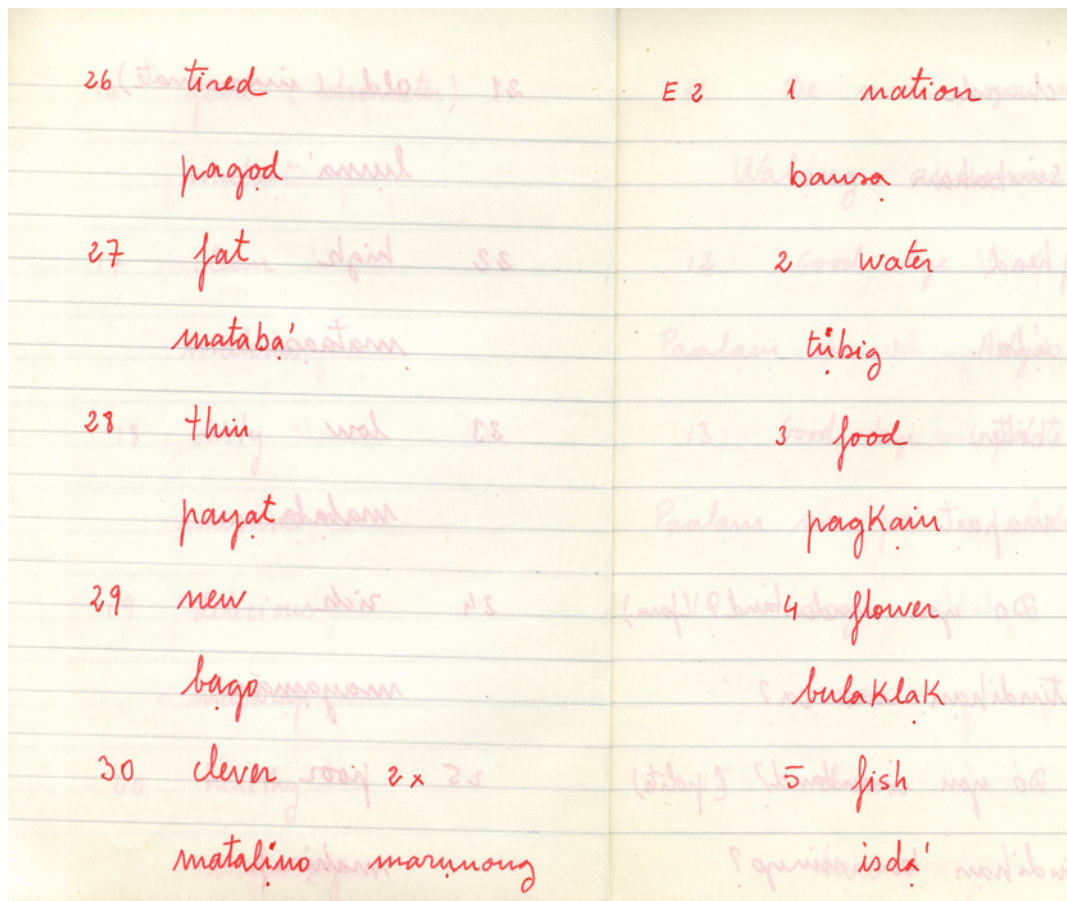


Image 29: Tagalog vocabulary

This student is learning Tagalog vocabulary. She is using 30-item exercises, which at that time were standard and were divided into 10-item units where required by certain students. As a result of continuous experience over the years, 10-item exercises were made standard and reduced to 5-item units for some students and increased to 30-item units for others, depending on their learning characteristics.

TAGALOG: MASTERING A DIALOGUE

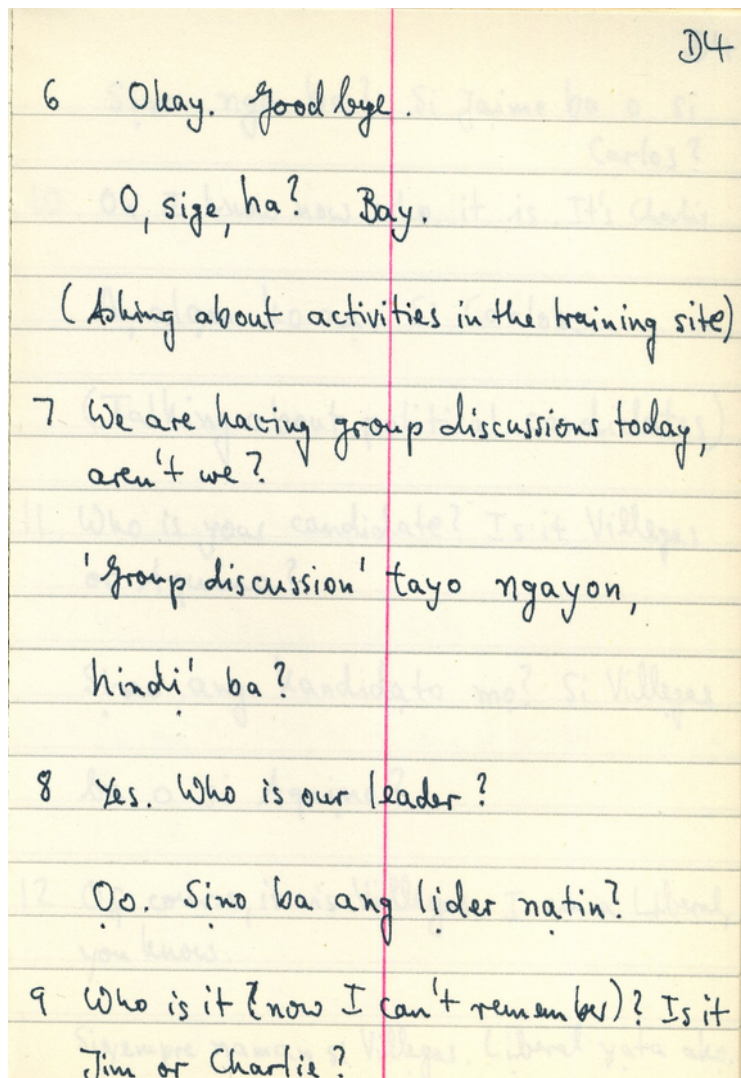


Image 30: Practising a Tagalog dialogue

The student has turned a dialogue from his textbook into a translation exercise, i.e. he practises the dialogue by using native language prompts. By the time he has mastered these exercises, every response will come promptly and correctly. He is then ready to go through the same dialogue as role play. He will be much better at it than a student who has not done the preliminary IDYLL exercise. His superiority will show even more strongly in months to come, when REV has come into play.

SANSKRIT VOCABULARY**Exercise 1**

1. horse
aśva (m)
2. fire
agni (m)
3. girl
kanyā (f)
4. poet
kavi (m)
5. angry
kupita
6. house
gṛham (n)
7. village
grāma (m)
8. four
catur
9. he laughs
hasati
10. they laugh
hasanti

SANSKRIT: SANDHI

Exercise 1: Convert the pada forms into sandhi forms

1. gacchati + aśvam

gacchaty aśvam > gacchatyaśvam

2. eva + avaśiṣyate

evāvaśiṣyate

3. rāmas gacchati

rāmo gacchati

4. virās gacchanti

virā gacchanti

5. rāmas pṛcchati

rāmaḥ pṛcchati

SANSKRIT: SANDHI

Thomas Egenes, p37: Transl. from Engl. into Skt.

5a. The men speak to the (one) deer.

-S: नराः ~~मृग~~ मृगम् वदति

+S: नरो मृगं वदति

5b. Rāma speaks to the horses.

-S: रामः अश्वान् वदति

+S: रामो अश्वान् वदति

5c. The son goes to the horse and stands.

-S: पुत्रः अश्वम् गच्छति तिष्ठति च

+S: पुत्रो अश्वं गच्छति तिष्ठति च

Image 31: Sanskrit pada and sandhi forms

The student has to translate simple English sentences into Sanskrit and apply the rules of sandhi. Prior to doing this exercise he will have memorised the individual Sanskrit words using PAPA and LASPEX. When he has mastered these, and has done formalised exercises covering some of the sandhi rules, he will be asked to apply the sandhi rules in (fairly) meaningful sentences, e.g. by translating from English into Sanskrit.

It is characteristic of the IDYLL METHOD that nothing is left to chance and the student is made fully aware of all the steps to be taken. He therefore first translates each sentence without sandhi and concentrates on the vocabulary and the rules of grammar (as opposed to phonology). The "-S" lines contain the answers prior to the application of sandhi. The "+S" lines contain the perfect answers after the application of sandhi. The student is not "allowed" to make mistakes by fast guesswork (as he would not be allowed if he were trained to become a bomb disposal expert). He is guided step by step, through no-sandhi to sandhi. When he has done this often enough in many different SAFE exercises, he will see (feel) instantly what the correct sandhi form is. Only then will he be allowed to skip the step of writing down the no-sandhi forms.

SIMILAR DIVISION OF PROBLEMS IN ARABIC

Similar principles apply to the student of Arabic. He first has to practise writing the words in the style which separates the letters, then in the style which joins the letters and writes the vowels in full, and finally in the commonly used style which joins the letters but omits the vowels.

Established teachers of Sanskrit and Arabic tend to resist these sensible provisions and thereby make life unnecessarily difficult for their students.

IMMEDIATE FEEDBACK OF RESULTS

Most Sanskrit courses do not give the answers to the exercises. The "teach yourself" courses which do, give them at the end of the chapter or at the end of the book. They therefore miss out on the enormous benefits of the Skinnerian principle of "immediate feedback of results", which the IDYLL METHOD always provides.

This defect also applies to several books which teach Arabic and Urdu script and provide model answers. (e.g. Delacey 2001)

Moreover these exercises are usually only done once. The student gets some sentences right and gets others wrong. The results are marked or discussed in class, and the class then moves on to the next topic and the next exercise.

This is extraordinarily wasteful, even with students of Sanskrit who, at least in the west, will be very dedicated.

The proper approach, recommended by the IDYLL METHOD, is to lay out all such exercises in the standard IDYLL format (as in the example), let the teacher (or textbook author) provide the model answers (rather than letting the student write out his own exercises), and then letting the student do the exercises according to the rules of PAPA, LASPEX and REV.

No harm is done by letting the student see the answers immediately underneath the question. The benefit is that the exercise will not be a test in disguise, but routine practice which will lead to 99% mastery.

In brief: Exercises in textbooks should not be done only once. Otherwise they are not exercises but tests, which contribute nothing to learning. Exercises should be practised until the student has mastered them, like a musician practises a piece of music. The IDYLL METHOD makes this possible.

LATIN SAYINGS

1. Eternal Rome
Roma aeterna
2. To spare those who have been defeated and defeat the proud
ones
Parcere subiectis et debellare superbos
3. I have read it, understood it and condemned it.
Legi, intellexi, condemnavi
4. I came, I saw, I conquered
Veni, vidi, vici
5. Rome has spoken, the matter is settled.
Roma locuta, causa finita
6. I am a Roman citizen.
Civis Romanus sum.
7. Whatever it is, I fear women, even if they dispense
kisses.
Quidquid id est, timeo feminas, et oscula dantes. (Beware
of Greeks bearing gifts)
8. Children are children (or: boys will be boys), and
children do childish things.
Sunt pueri pueri, pueri puerilia tractant
9. Buyer beware
Caveat emptor
10. Beware of the dog
Cave canem

JAMAICAN PROVERBS

1. Familiarity breeds contempt

Play wid puppy, puppy kiss you mout.

2. If in front of Gaddafi you show respect, once he has turned his back, you spit out.

Frontadaag "MaassaDaag", backadaagadaag

Front a dag "Maassa Dag", back a dag a dag

In front of dog you say "Master Dog", back of dog juss
callim "a dog"

LATIN: VULGATA: GENESIS 1

1. the beginning
principium
2. in the beginning
in principio
3. to create
creare
4. he created
creavit
5. God
Deus
6. God created
Deus creavit
7. heaven
caelum
8. the earth
terra
9. In the beginning God created heaven and earth.
In principio creavit Deus caelum et terram.
10. empty
inanis

(For next exercise:

1. it was
erat
2. The earth was empty.
Terra erat inanis.

NEW TESTAMENT GREEK: JOHN 1**Exercise 1**

1. the beginning

ἀρχή

2. word

λόγος

3. and

καὶ

4. God

θεός

5. everything

πάντα

6. without

χωρίς

7. life

ζωή

8. light

φῶς

9. man (human being)

ἄνθρωπος

10. darkness

σκότος

JAPANESE, INCLUDING INTONATION

Ex. A43	5 You're welcome. (= Bitte.)
1 Excuse me, I must be going. (- -)	Dō-ita shima shite.
Shitsurei shimasu.	6 What's your name?
2 event	Anata no namae wa, nan desu ka?
gyōji	7 fruit
3 nine (J)	kudamono
kokonotsu	8 wool
4 painful, sore	uru
ita.i	

Image 32: Japanese (including intonation)

In this Japanese vocabulary exercise for beginners, the intonation has been written in, using western musical notation.

**BENEFITTING FROM
READING NOVELS AND MAGAZINES:
FRENCH EXAMPLE**

J14			J14		
1	whole lot of	p57	6	to stumble	p59
	le ban et l'arrière ban			trébucher	
2	She rules me with a rod of iron. (she wears the trousers)	p58	7	frightened eyes	p60
	Elle me mène à la baguette.			les yeux effarés	
3	a corner, a corner cupboard		8	to climb, to mount (g-)	
	une encoignure			gravis	
4	a young man of good social position		9	step (of stairs, ladder)	
	un fils de famille	p59		le degré	
5	street urchin		10	to chirp (of birds)	p6
	le polisson			pépier	

Image 33: French vocabulary from novels

Once the student no longer attends classes he is in danger of never progressing, never enriching his linguistic repertoire. He can prevent forgetting by continuing his IDYLL revisions, by conversation and correspondence with other speakers, but he may add not enough new language elements (words, phrases, sentence fragments, idioms, grammatical constructions, etc) to his repertoire. Conversation/chatting with native speakers, face to face or via the Internet, is only of limited value, especially since the repertoire of his partner may not be particularly rich.

If the student really wants to enrich his language, he has to read good literature. For students of English I would recommend high quality novels (including the classics) and magazines such as THE ECONOMIST (UK) and NEWSWEEK (USA). For listening and transcribing, there is, of course, the BBC. We want our student to become an educated speaker of his target language, not someone who can manage only small talk or survive in the pub. Therefore his linguistic models must be the best.

Anything new he can pick up during conversations passes too quickly. Writing it down or asking questions about it will halt the flow of information during the conversation and be annoying to his partner. Moreover the vocabulary his native partner uses may be trivial and not new to the learner.

The IDYLL METHOD recommends that the student reads regularly, that he looks up between 5 and 10 words per page in the dictionary, and that he copies about 5 of these words into his IDYLL workbook, and then gives these words (or phrases, etc) the standard IDYLL treatment: PAPA, REV, SENTAL, DIARY METHOD, and thence feeds it back into his conversations and tries it out on his live partners. SENTAL and the DIARY METHOD make sure that he assimilates the new language elements, considers good ways of using them in everyday life.

The student keeps a separate workbook alongside each novel, or magazine, he reads. Next to each group of words, he writes the page number in the source. This enables him to look up a context if, later, he ever has any doubts or his usage of the word is ever challenged by a native speaker.

In the example above the source book was Daudet's "Le petit chose".

SUBJECTS OTHER THAN LANGUAGES

The following examples show that the IDYLL METHOD can also be used in other subjects where memory and retention is required.

CHEMISTRY: THE PERIODIC TABLE**Exercise 1:**

Write the names of the elements denoted by each chemical symbol

- 1 H
 hydrogen
- 2 He
 helium
- 3 Li
 lithium
- 4 Be
 beryllium
- 5 B
 boron

KUWAIT HISTORY QUIZ

1. What is the Arabic name of the State of Kuwait?

Dawlat al-Kuwayt.

2. Explain the meaning of the word 'Kuwait'.

Arabic 'kut' means 'fort'. 'Kuwait' is the diminutive of 'kut' (as 'kitchenette' is the diminutive of 'kitchen') and means 'little fort'.

3. Kuwait joins the sea. Name its location (two names).

It lies at the Persian Gulf (= Arabian Gulf).

4. Why are there two names for this Gulf?

Because on one side is Persia (Iran) and on the other Arabia (Saudi Arabia).

5. Be more precise about the location. (Wanted: two additional pieces of information)

It lies at the (1) upper (2) northwestern corner of the Persian (Arabian) Gulf.

6. etc

Any historical subject can be studied and practised in this style.

**RELIGIOUS KNOWLEDGE:
SHIA ISLAM: THE BATTLE OF KERBALA**

Introduction for the student

Arabic nations are trying to liberate themselves from their dictators. In some countries (e.g. Iraq and Pakistan), Sunni and Shia Muslims are murdering each other. Islamic extremists hate "the west" and are attacking it. To understand all this, it is useful for non-Muslims to know and understand what Muslims grow up with and believe and are passionate about, especially how stories are handed down to Muslim children from one generation to the next. It is more important for us to know what children believe than what scholars say.

This quiz enables you to learn and talk about the Battle of Kerbala from the Shia perspective. Sunnis will give a different version.

In the following example, the whole story is told in question and answer form so that it can easily be learnt and rehearsed even by people who do not grow up with these stories and hear them for several years on each relevant festival day.

Exercise 1

1. Name the first month of the Islamic calendar.

Muharram

2. What does the word "Muharram" mean?

Violence is forbidden. mu = violence, haram = forbidden

3. Which is the most important day in Muharam?

Day 10, called Ashura (= tenth)

4. What do Sunnis commemorate on Day 10?

A great victory which Musa (Moses) had over the Pharaoh on this day.

5. What do Shias commemorate on Day 10?

The martyrdom of Imam Husayn?

6. Name a favourite daughter of the Holy Prophet?

Fatima

7. Whom did Fatima marry?

She married Ali, the cousin of the Holy Prophet.

8. Fatima and Ali had several children. Name the second son of Fatima.

Husayn, also known by Shias as Imam Husayn

9. Who was Husayn in relation to the Holy Prophet?

He was his grandson.

10. Did Imam Ali have only one child?

No, he had several, from several wives

**RELIGIOUS KNOWLEDGE: ISLAM:
THE FAMILY OF THE HOLY PROPHET**

Exercise 01

1. Name one of the ancestors of the Holy Prophet. (I-)
Ibrahim in the Holy Qur'an (Abraham in the Bible)
2. Name the wife of Ibrahim
Hajar
3. Ibrahim and Hajar had a son. What was his name?
Isma'il
4. God ordered Ibrahim to leave home and go to a certain place in the Arab desert. That place is now called Mekkah. What was it called then?
Al-Hejaz
5. Ibrahim left Hajar and Isma'il in that desert place (as ordered by Allah) and returned to Palestine (as ordered). When Hajar had no more water, she left Isma'il and went desperately looking for water, but could not find any. When she returned to the baby, what did she see?
A spring had arisen next to the baby.

6. That spring made the typical murmuring sound of water. What is that sound called in Arabic?

zamzama

7. The well was named after that sound. What is the name of that well?

Zamzam

8. Allah had promised a large number of offspring (descendants) to Ibrahim. Name the most famous of these?

The Holy Prophet Mohammed.

9. Name a Christian parallel to this story?

Jesus is described in the Bible as a descendant of King David (see Luke, Ch 2; and Matthew Ch 1, Genealogy)

10. A city was built next to Zamzam. What is it called?

Mekkah. Desert travellers stopped there for water.

Exercise 2

1. A famous religious building was built in Mekkah. What is its name?

Ka'ba

2. Who built the ka'ba?

Ibrahim and his son Isma'il.

3. The grandfather of the Holy Prophet Mohammed was a descendant of Ibrahim. What was his name?

Abdul Mutalib

4. Abdul Mutalib's son was the father of the Holy Prophet. What was his name?

Abdullah

5. What was the name of the Holy Prophet's mother?

Aminah

6. The Prophet Mohammed grew up as an orphan. When did his father Abdullah die?

Six months before Mohammed was born.

7. Where did Mohammed spend the first six years of his life?

In the desert, with his foster mother.

8. What was the name of his foster mother?

Halimah

9. Eventually Mohammed's grandfather died. So he was orphaned again. Who was then responsible for his upbringing?

His uncle, Abu Talib.

10. As a young man Mohammed acquired a reputation for being particularly honest and truthful. He was therefore given a very honourable "nickname" in Arabic. What was the name?

Al-Amin = honest, truthful

**RELIGIOUS KNOWLEDGE: CHRISTIANITY:
THE BIRTH OF JESUS**

Exercise 1

1. Was Jesus born in a hospital?

No, he was born in a stable.

2. What were the names of His parents?

Joseph and Mary

3. In which town was he born?

In Bethlehem

4. Was that the town where Joseph and Mary normally lived?

No, they normally lived in Nazareth.

5. What on earth were they doing in Bethlehem at a time when Mary was pregnant and about to give birth?

The Roman occupiers of Palestine had ordered them there, to be registered., as part of a census (count of the population).

6. Why didn't they stay in a pub, an inn or a hotel?

There were no vacancies. Bethlehem was crowded with lots of people who had all turned up for the census.

7. Who were the first people to be told that Jesus had been born?

A group of shepherds in the fields nearby.

8. Who told them?

An angel.

9. etc, etc

Exercise 2

1. 1 Somebody wanted to kill baby Jesus. Who was it?
King Herod.
2. Where did King Herod live?
In Jerusalem.
3. How far is Jerusalem from Bethlehem?
Only 6 miles, less than from Blackburn to Preston.
4. Why did King Herod want to kill little Jesus?
Three wise men had told him that a king had been born in Bethlehem.
5. Why did that bother King Herod?
He was afraid that any new king might oust him (depose him, drive him out of power).

6. Did King Herod know how to recognise Jesus, the new-born King? Did he know what he looked like or in which house in Bethlehem to find him?

No, he didn't have a clue, but he had to get rid of his rival (Jesus) by hook or by crook.

7. How did King Herod solve the problem of killing baby Jesus without knowing exactly where he was?

He sent a group of soldiers and they had orders to kill every baby in Bethlehem under two years of age. And that's what they did.

8. What did the mothers of those babies think about that?

They started crying and howling and the whole town was terrrrrrrrribly unhappy.

9. Did the soldiers manage to kill baby Jesus?

No, they didn't. Jesus and his parents had already left Bethlehem.

10. How did they manage to get away just in the nick of time?

An angel had warned Joseph in a dream and told them to go to Egypt as fast as they could. So they had been lucky this time, but the other babies and their mothers had been unlucky.

**RELIGIOUS KNOWLEDGE: HINDUISM:
THE BIRTH OF LORD KRISHNA**

Exercise 1

1. Where was Lord Krishna born, in a hospital or in a palace?

He was born in prison. (see Note 1: below Exercise 2)

2. Was Krishna a normal human being?

No, he was a god (an incarnation of God = God in a human body).

3. Lord Krishna was an incarnation of which god?

He was an incarnation of Lord Vishnu?

4. What is the function of Lord Vishnu, among other gods of his kind?

Lord Vishnu is the Preserver, he helps to keep our world in good shape.

5. There are three other well-known gods, two of them male, like Lord Vishnu, and one of them female. First we briefly look at the male gods. One of them is known as the **creator** god. What is his name?

The creator god is Lord Brahma.

6. So we have now
Lord Brahma, the creator,
Lord Vishnu, the preserver,
but we also have a destroyer because nothing in this world, except God, is permanent. What is the name of the destroyer?

The destroyer is Lord Shiva.

7. The female God, the Mother of the Universe, has all the powers of all the male gods taken together. She is therefore more powerful than any of them alone. What is her name?

She has many well-known names, one of them is simply The Devi (the goddess).

(Note for learners: People also refer to her as Mataji, The Mother. She manifests as Durga, Kali, Parvati, Sita, Saraswati, and in many other well-known forms.)

(See Note 2 for educators, below)

8. Brahma, Vishnu, Shiva and the Devi are personal Gods. What do they have in common?

They all are manifestations of the one GOD THE ABSOLUTE, in whom everything exists and apart from whom nothing exists.

9. What is the name of GOD THE ABSOLUTE?

The impersonal GOD THE ABSOLUTE is called Brahman.

(Warning: Distinguish

Lord Brahma, the creator,

from Brahman, GOD THE ABSOLUTE

and from Brahmin, member of the priestly caste.)

10. Did Lord Vishnu incarnate (come down to earth) only once?

No, whenever evil in this world becomes too strong, when there is too much crime, too many wars, too much torture, too much immorality,

Lord Vishnu comes to earth to put the BALANCE between good and evil right. He does not eradicate evil altogether, but he weakens it so that good people have at least a sporting chance.

(Note: In a completely crime-free world there would be no nice who-dunnits on TV, no work for lawyers, prison officers, policemen, locksmiths and glaziers, and tax inspectors. They would all be unemployed and turn to crime to make a living. Professional thieves and burglars and their innocent babes would starve.

Lord Vishnu is merciful and has sympathy even with the crooks. We all have to live, even the poor bankers: but sometimes too much is too much, or at least, enough is enough. And when that happens, not very often!, then Lord Vishnu comes down like a ton of bricks, believe me! It happened at least eleven times so far, but presumably much more often, and we just didn't notice because God likes to hide where we are least likely to look for Him.)

Note 1, for educators:

Question 1 of this exercise (hospital vs palace) is deliberately misleading. Students must learn not to guess, and their knowledge must be so firm that they recognise misleading questions as such, resist them and even argue with their teachers or examiners if need be. This is a form of immunisation, which is also used in the IDYLL style of language teaching.

In the IDYLL exercises, we contrast the features of the native language with those of the foreign language. We tempt the student into making "typical mistakes", usually caused by literal

translation from the native language. The mistakes he may make initially gives IDYLL a chance to persistently correct him until he can no longer be tempted into making these mistakes.

Example: A typical mistake of a German speaker learning English will be the following.

- Correct English:
I have been here for six weeks.
- Wrong English caused by interference from German:
I am here since six weeks.
- German equivalent:
Ich bin seit sechs Wochen hier. (I am since six weeks here.)

IDYLL question and answer:

Q: Ich bin seit sechs Wochen hier.

A: I have been here for six weeks.

**SIMILAR INTERFERENCE MISTAKES
FROM OTHER LANGUAGES
(NON-ENGLISH SPEAKER LEARNING ENGLISH) :**

The Hindi-Urdu speaker will confuse "tomorrow" and "yesterday" (same word in his language, the distinction is made through the verb tense). Typical mistake: "I very much enjoyed our chat tomorrow". Similarly he will have interference problems with indirect speech (combining the "that" of indirect speech with the person of indirect speech): "She told me that you must apply in writing", instead of "She told me that I must apply in writing". This kind of mistake is bound to provoke great astonishment or even panic, e.g. when a friend told me by MSN: "My father said that you must get married tomorrow."

The Arabic speaker will omit the copula is/are etc; e.g. "I in Egypt"

The IDYLL use of translation in exercises and the use of the native language is therefore not a hindrance to learning to speak a foreign language correctly, but an invaluable tool in producing fluent and error-free speakers. We confront our students with potential mistakes instead of pussy-footing around them.

Note 2, for educators:

The other names are added here in order not to upset Hindu children, who are familiar with many other names, none of which are wrong. But children doing this quiz are not expected to produce all these names.

Exercise 2

1. Why was Krishna born in a prison?

Because his parents were in prison.

2. What was the name of his parents?

His mother was Devaki, and his father was Vasudeva.

3. Who put his parents into prison?

King Kansa

4. King Kansa was the ruler of which town?

King Kansa was the ruler of Mathura.

5. Was King Kansa a good King?

No, he was a demon, a very wicked and cruel person, who did a lot of harm to many good people in his kingdom.

6. Why did he throw Devaki and Vasudeva into prison?

Because he had been told that their eighth child (Krishna) was destined to kill him.

7. What happened to the children born in prison to Devaki and Vasudeva?

The first six of them were killed by the evil king immediately after their birth. The seventh child miraculously escaped.

8. Obviously Krishna was not killed, otherwise we would not have his story. What happened in prison when he was born?

The prison cell was illuminated by a tremendous light, brighter than a thousand suns, to show that this baby was divine. The guards fell asleep. The chains which shackled Vasudeva fell off, the prison doors opened. Vasudeva was told to take the new-born baby, Krishna, to a little village on the other side of the river.

9. What is the name of that village, where Krishna grew up?

Krishna grew up among the shepherd boys and girls of Gokula.

10. etc

INDIAN EPICS

Exercise 1

1. Name the authors of the two most popular versions of the Raymayana, one in Sanskrit and the other in Hindi.

Valmiki (Sanskrit), Tulsidas (Hindi)

2. What is the name of the great battle field in the Mahabharata?

Kurukshetra

3. Yudhishthira refused to go into paradise because entry was refused to his faithful companion who had followed him through thick and thin. What was the name of this woman?

4. It was not a woman, it was his faithful dog. The dog's name was Dharma.

5. etc

Question 3 was so formulated in order to train the student to resist misleading questions. He must be so sure of his ground (which is possible with our algorithmic methods) that he will insist on being right, even against the examiner. E.g. in maths: "If Henry VIII had 6 wives, how many wives had Henry IV?" Answer: 3.

COMPUTER KEYBOARD LAYOUT

IDYLL can also be used to memorise the layout for a computer keyboard. All my Arabic fonts, e.g. Gentium, or Scheherazade, have the same keyboard layout. That is good. Moreover my Urdu characters often somehow resemble the English characters located on each key, e.g. Urdu "m" /mi:m/ م sits on English M and the tashdid (consonant doubler) ّ (example left is the tashdid on top of the /mi:m/), which looks a bit like a small w, sits on W-shift. That is also good. But the location of the Arabic characters is arbitrary (from the English point of view!), has no bearing to the English letters written on my keys. Arabic /mi:m/ sits on English L and Arabic tashdid sits on the indescribable key left of English digit 1. The Arabic locations are therefore very difficult to learn and to remember. Consulting a printing chart before typing each character, which I had to do initially, is a time-consuming nightmare which might continue for years.

Even here, an IDYLL exercise can help me learn the keyboard faster. In the following sample, the idea is that I know which Arabic character I want to type, and I must be able to say quickly which key I have to strike to produce it.

Example: ب /ba:/ sits on F, ت /ta:/ sits on J, and ث /θa:/ sits on E

The IDYLL exercise for practising this kind of relation will look like this. Into the question line I put the Arabic character and its name in IPA (and I do this for lower case AND for upper case in the same line. Into the answer line I put the label on the English key.

Exercise 1

In each item, first comes the lower case and then the upper case character.

1. ب /ba:/ --- [

sits on F

2. ت /ta:/ --- .

sits on J

3. ث /θa:/ --- '.

sits on E

The IDYLL METHOD

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