13th International Conference on TESOL
Breakthroughs in English Language Teaching in the Post-Pandemic
SEAMEO RETRAC, November 17-18, 2022

Curtin University

ISO 9001:2015

Three language-learning approaches you probably didn't know existed

Professor Andrew Lian
Ho Chi Minh City Open University, Viet Nam
Suranaree University of Technology, Thailand
Professor Emeritus, University of Canberra, Australia

THANK YOU!

SEAMEAO RETRAC

CURTIN UNIVERSITY

For the privilege of speaking here today!

It is a great honour!

Why choose this title?

Finding interesting titles for keynote addresses is often a bit of a challenge.

I do a lot of work with computers and watch a lot of videos on YouTube relating to them. I often come across titles similar to: *10 Amazing websites you didn't know existed* or *10 Secret websites you've never heard of before*. So, I thought I'd give it a go with some approaches that most of my doctoral students have never heard of.

Of course, I don't really mean that no one will know of the existence of these approaches, especially if they are teaching in universities.

Rather, I am guessing that many of you will, in fact, know these approaches, but that maybe more will not. I suppose we will find out.

So… let's begin…

The first approach is…

Rhizomatic Learning

Rhizomatic learning 01

Rhizomatic learning comes out of French postmodern philosophy and is based on the work of Gilles Deleuze and Félix Guattari *(A thousand plateaus, 1980).*

I will spare you the philosophy, but suffice it to say that rhizomatic learning is characterized by

the creation of a learning environment designed to elicit and solve the moment-to-moment problems encountered by each individual learner as they attempt to complete BIG tasks not unlike those of task-based learning or project-based learning.

Rhizomatic learning 02

There is no detailed curriculum (except for the triggers provided by the BIG tasks),

no compulsory activities, no advance organisers, no specific vocabulary, no verb tenses, no prepositions, no discourse structures and so on.

Everything that needs to be learned will be learned along the way as it is needed by students in the process of solving the big tasks that they are undertaking and who have a need. At those moments, motivation is high.

These big tasks come in many forms and are the “curriculum-starters” for the learning programs undertaken by learners. An example: make a video simulating a day on French television.

Rhizomatic learning 03

The big questions set the learning context. Actual learning sequences are determined by each student as they grapple with the unpredicted and unpredictable difficulties that they encounter and want/need to correct.

Thus, each student's path to success, the sequence of activities they undertake, their personal learning environment, is likely to be different from that of his/her colleagues (if any) and will, in essence, form an individual syllabus *post facto*.

The rhizomatic structure does not pre-determine activities but can list, track and describe them after the fact. That information can then be made available to learners, teachers, educational institutions etc., and can serve for personal improvement and form the core of many research projects.

Rhizomatic learning 04

For greatest success, such a system will require access to as many resources as possible, ideally resources tailored for the needs of learners.

For that to happen under the best circumstances, students' learning patterns will need to be researched in detail – it will have to become a priority for the field – we will see some related examples later.

In this way, we can be sure that, to the extent possible, we are addressing students' real needs rather than their needs as imagined by themselves or by their teachers.

Rhizomatic learning 05

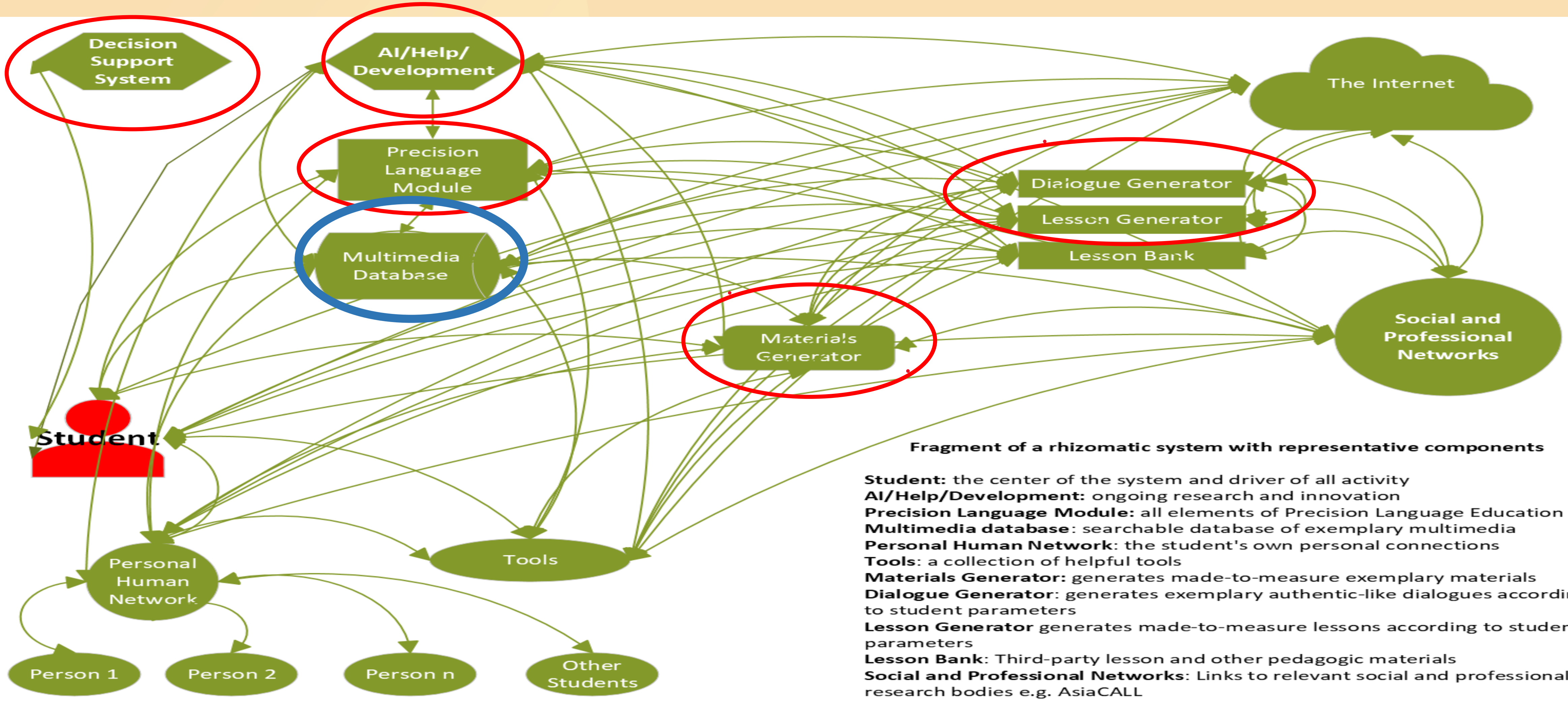
How will students realize that there is a problem? When it is clear to them that there is something they cannot do OR

When someone or something tells them that they are not performing well.

They can then turn to the available learning infrastructure to create a path for themselves. Ideally, technology will play a major role here (but much research remains to be done). Note that teachers form part of the learning infrastructure. They are not excluded.

Something like the picture in the following slide.

Rhizomatic learning 06



Fragment of a rhizomatic system with representative components

Student: the center of the system and driver of all activity
AI/Help/Development: ongoing research and innovation
Precision Language Module: all elements of Precision Language Education
Multimedia database: searchable database of exemplary multimedia
Personal Human Network: the student's own personal connections
Tools: a collection of helpful tools
Materials Generator: generates made-to-measure exemplary materials
Dialogue Generator: generates exemplary authentic-like dialogues according to student parameters
Lesson Generator generates made-to-measure lessons according to student parameters
Lesson Bank: Third-party lesson and other pedagogic materials
Social and Professional Networks: Links to relevant social and professional/ research bodies e.g. AsiaCALL
The Internet: The Internet
NB. All materials can be assembled by educational institutions or students

Rhizomatic learning 07

Can learners solve their own problems?

If the infrastructure is good and the learners are engaged, then the majority of problems will be solved as help is plentiful – e.g Parnkul study, Chaiwiwatrakul study.

Also, Sugata Mitra (hole in the wall, SOLEs).

And remember that teachers are not excluded from the infrastructure, so advice can be obtained if needed.

Rhizomatic learning 08

Advantages:

True individualization – more effective learning

Better utilization of people and resources etc – greater flexibility

Learners become more autonomous

Curtin University

ISO 9001:2015

Rhizomatic learning 09

Disadvantages:

Contradicts current classroom/syllabus-based practices

Possibly more costly unless funds are diverted from current models

Unpredictable in terms of time etc…

Administrators may perceive as chaotic and disorderly

Educational reform required (in more than languages)

More research needed

Just in case you think this is unusual 01

This is exactly what we do spontaneously when we need to solve a problem in today's technologically-supported world.

Furthermore, nowadays, our technology-smart society expects personalized solutions. What do we do when our printer breaks down?

We go to Google or YouTube where we are presented with some choices.

We select one of these choices or modify it and then apply it, according to our understandings, to our own printer in an experimental manner.

If the solution works, we are happy. If it does not, we consult with others of increasing expertise until we find a solution that does work.

This is the essence of rhizomatic intervention, and we engage in this activity all the time.

Just in case you think this is unusual 02

We just don't call it rhizomatic, we call it finding a solution for ourselves on the Internet and we do not claim that it is a form of education.

And yet it is a form of education – we have learned a great deal from our Google/YouTube experience.

We have been conditioned to accept that education must be regulated and government-controlled, that it must have an approved syllabus that it must comply with a set of regulations, also approved, and that any form of education that is not so regulated is suspect and bad.

And that governments/teachers etc. know best.

And by the way…

There actually are educational systems that mirror rhizomatic learning

Sugata Mitra's Self-Organizing Learning Environments (SOLEs) and

The Sudbury Valley school system, amongst others and

There are several published studies from SUT and other places which show successful outcomes for rhizomatic approaches.

The second approach is

Verbotonalism

Verbotonalism 01

Verbotonal Theory or

Verbotonalism

Professor Petar Guberina, University of Zagreb

Has tended to be dormant for many years but revived in recent research at Suranaree University of Technoology and elsewhere.

Verbotonalism 02

It is a theory of perception with special application to both the hard of hearing and language learners and has been widely used for both though largely invisibly – and also most documents are in French or Serbo-Croat.

Its principles have been applied beyond perception to language learning (badly actually for the most part).

While the theory is heavily used for pronunciation work, it can be thought of as a theory of comprehension as it treats sound recognition as an act of comprehension – not just as a physical signal (the brain makes sense of incoming physical signals and distinguishes between language and non-language sounds).

Verbotonalism 03

Characteristics of verbotonal theory include:

A focus on awareness-raising to circumvent the blockages from our past.

An understanding that phonemes and other language sounds can be recognised on the basis of limited frequency bands (called optimals). Each language sound has a distinctive set of optimals.

Verbotonalism 04

There are native speaker optimals and corrective optimals (for FL learners). Corrective optimals vary from learner to learner although they may form some groupings.

In order to be able to pronounce foreign language sounds, a learner needs to perceive the foreign language optimals correctly – i.e. in a way that enables him/her to pronounce them correctly.

They need to be able to access the critical elements of the sounds in question – and that can be tricky without some awareness-raising help.

Verbotonalism 05

Sounds are not isolated from their linguistic and communicative context

The right brain is of extreme importance in perceiving language sounds – the right brain preferentially processes melodic information.

This characteristic can be used to enable learners to process the foreign language more successfully through the exploitation of melodic information.

Intonation is not separate from phonemes, it is an integral part of all voiced sounds.

Verbotonalism 05

Verbotonalism sees language as a whole-body experience and uses many techniques to enhance language perception and production and to increase awareness of the sounds and prosody of language.

In particular, it uses the technique of “dancing” to the melody of the language which is presented to learners in the form of low-pass filtered samples.

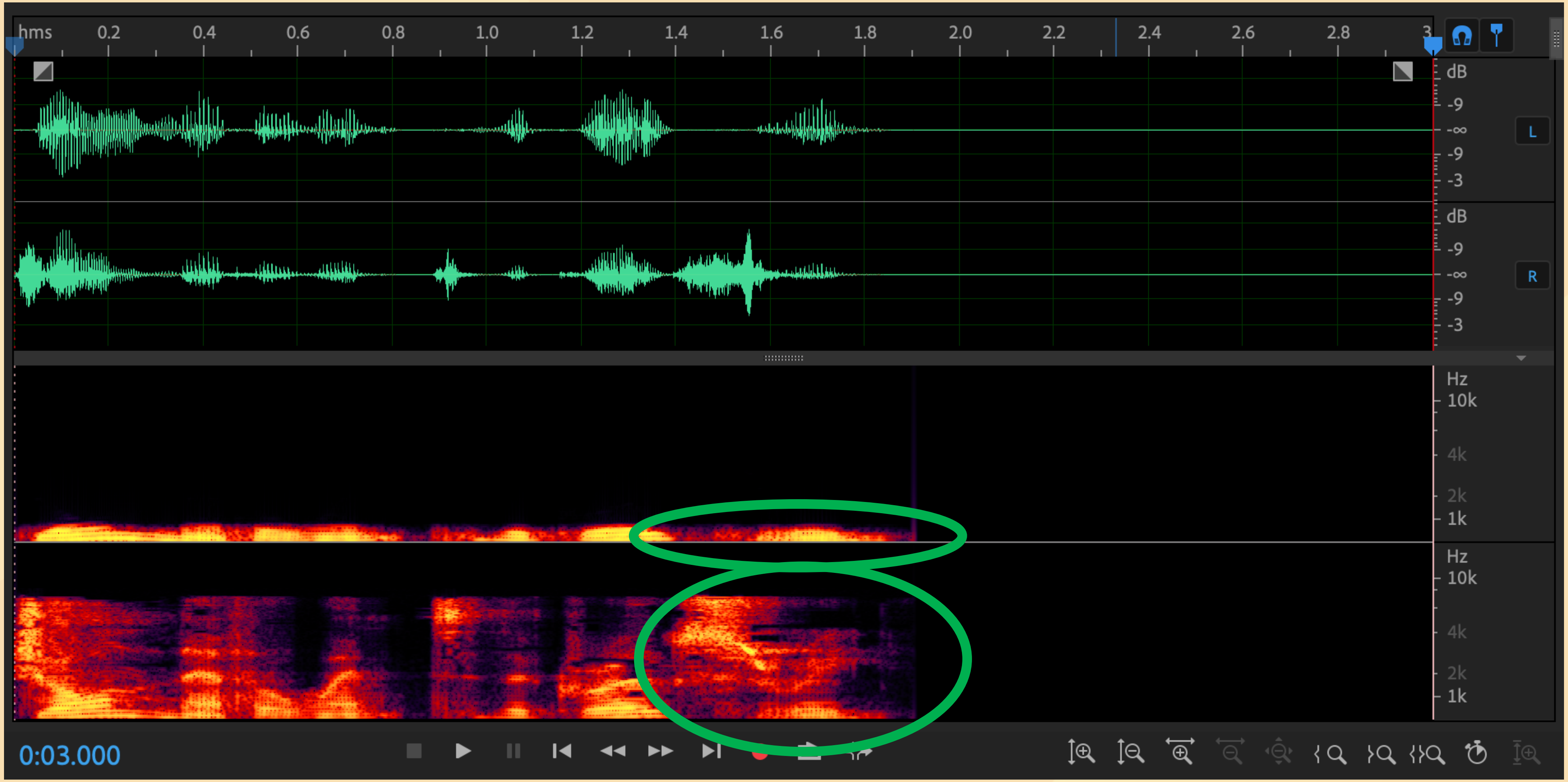
Filtering of the sounds of language is one of the more intriguing aspects of awareness-raising with verbotonalism. Filtering can be applied to both prosody and individual sounds.

Filtering is a process by which an audio signal has certain frequency ranges removed, thus altering the quality of the sound sent to the listener.

Here is an example

Filtered

Unfiltered



Here is an example

e.g. low-pass filtering (<320Hz) highlights the melody of the language (including rhythm, stress and loudness). This can be used to teach intonation.

Low-pass filtering is designed to reveal the intonation and other prosodic features of language. Different filters can be used for other purposes such as helping with individual phonemes. Here is an example of digital filtering (low-pass filtering - < 320Hz - in this case)

Three Recent SUT Studies 01

(a) enhancing the intonation of Chinese university students of English (He et al., 2015; He & Sangarun, 2015). We wanted university graduates to be understood.

(b) enhancing the speaking skills of 8-9-year-old Chinese learners of English (Yang et al., 2017) we wanted children to be understood and also investigated phonological working memory

(c) enhancing the ability of Chinese university learners of English to produce and contrast acceptably, a selection of vowel sounds (Wen et al. 2020).

All three studies focused on intelligibility rather than native-speaker compliance in the spirit of English as a Lingua Franca.

Three Recent SUT Studies 02

The first two studies (Professor Dr. He Bi and Professor Dr. Yang Yan) focused on global characteristics of the language, i.e. intonation, rhythm and other prosodic features

In verbotonal theory, the learning of prosodic features of language precedes the learning of individual sounds. This is because developing correct prosody is expected to automatically develop correct phoneme production. Some sounds may remain difficult and are considered to be residual problems requiring special intervention after prosody has been controlled

The third study (Dr. Wen Fengwei) focused on the production of specific individual sounds. As opposed to the other studies, it involved two phases: a diagnostic phase and a corrective phase

Three Recent SUT Studies 03

There is no time for detailed explanations here but low-pass filtering, because it is highly melodic, is believed to impact directly on the right hemisphere of the brain which is good at processing melody. Thus, for prosody training, listening to filtered language will have a much greater impact than listening to natural language.

One of the basic principles of verbotonal theory is that in the case of pronunciation (and perhaps other areas too) <u>if you provide the learner's brain with the right kind of physical signal then the brain will do the rest</u> and perceive and produce better.

Because the work is done unconsciously by the brain, there is no need for intellectualization e.g. reference to articulation diagrams, or how to hold your mouth, lips etc. There is also no need for motivation – just doing it is enough

Three Recent SUT Studies 04

All three experiments involved only listen-repeat activities. There was no recording of voices and no comparing with native speaker models.

There was no actual teaching of anything by a teacher other than pointing out connections between intonation or sound patterns and intonative functions or meanings of words (if unknown) – same as the control group. Otherwise, a human was present to organize the session and make sure the students followed basic instructions on how to listen and how to "dance" (only for the first two groups). All groups had both in-class and out of class activities.

Three Recent SUT Studies 05

All experiments were successful, with highly significant statistical results (often $p < 0.0001$) with tightly controlled variables and double-blind ratings – performing many times better than the control groups. With the children, phonological working memory also grew – leading, in principle, to more efficient processing of spoken language.

Sometimes results were surprising and unexpected e.g greater fluency

The biggest surprise was that students improved significantly despite the lack of teacher intervention.

Basically, improvements happened only through exposure to specially-treated auditory signals (sometimes enhanced with gesture).

In other words, as hypothesized, once the right signals were sent, the brain actually did all the work automatically

Another experiment 01

This finding led to another experiment carried out by Dr. Cai Xirui at Kunming Medical University (Cai, X., Lian, A.-P., Puakpong, N. et. al. (2021))

Following an experiment that I had done in Thailand using dichotic listening (low-pass filtering in the left ear, normal language in the right ear and vice-versa), Cai investigated brain activity in response to exposure to similarly-configured dichotic signals.

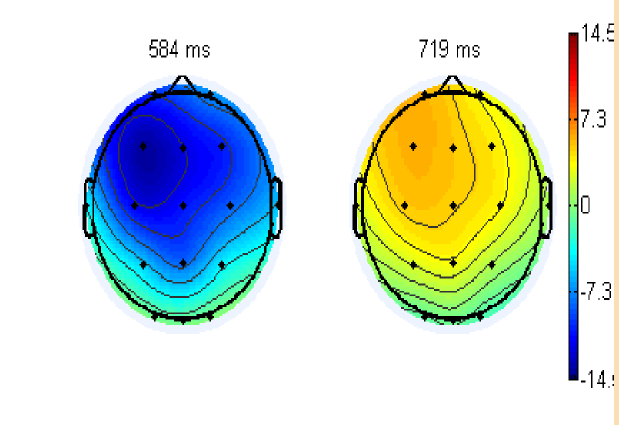
He discovered that Chinese learners of English processed best Left Ear filtered – Right Ear Unfiltered audio signals (load was lightest) and that they processed worst with the opposite configuration, i.e. Left Ear Unfiltered – Right Ear Filtered (load was the heaviest).

This confirmed the hypothesis that sending each brain hemisphere the signals that it best processed facilitated overall processing and that this was better than listening to unfiltered language in both ears.

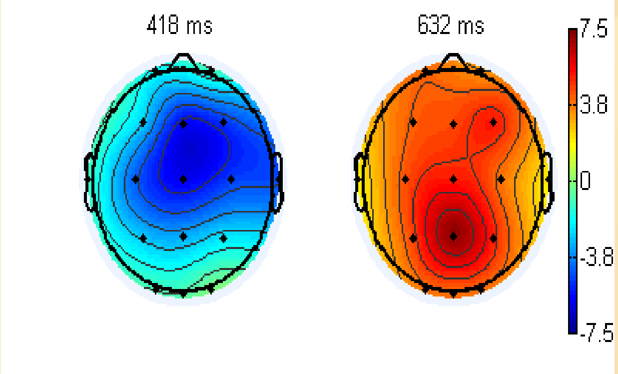
A low processing load means more mental resources are available for other tasks.

Another experiment 02

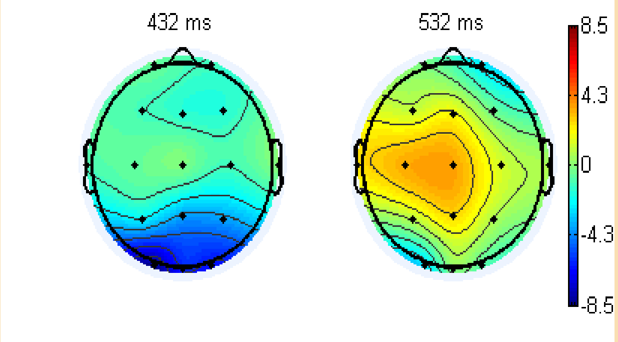
This study was conducted using Event-Related Potentials (electroencephalogram waves) technology



R



FR



FR

Results

Another experiment 03

And fMRI (functional Magnetic Resonance Imagery) technology to track the bloodflow of people in the act of processing the dichotic signals

Another experiment 04

It would seem that exposing language learners to Left Ear Filtered – Right Ear Unfiltered audio signals is a good way of increasing the processing resources available for other things, like making meaning of the signals.

This is a good way of increasing the amount of critical support available for language learning at minimal cost, especially in today's mass market.

In other words, acting on the physical signal itself, something that is never done routinely (if ever), may provide students with a learning advantage.

Currently, a highly controlled double blind experiment conducted by Zhang Shaobing, in China, seems to indicate that mere exposure to a dichotic signal instead of a normal signal provides a significant advantage for developing speaking skills.

We currently have FonF and FonFs. Now it looks like we may be entering a new era of FonPh or Focus on the Physical. More experiments are certain to follow.

The third approach is

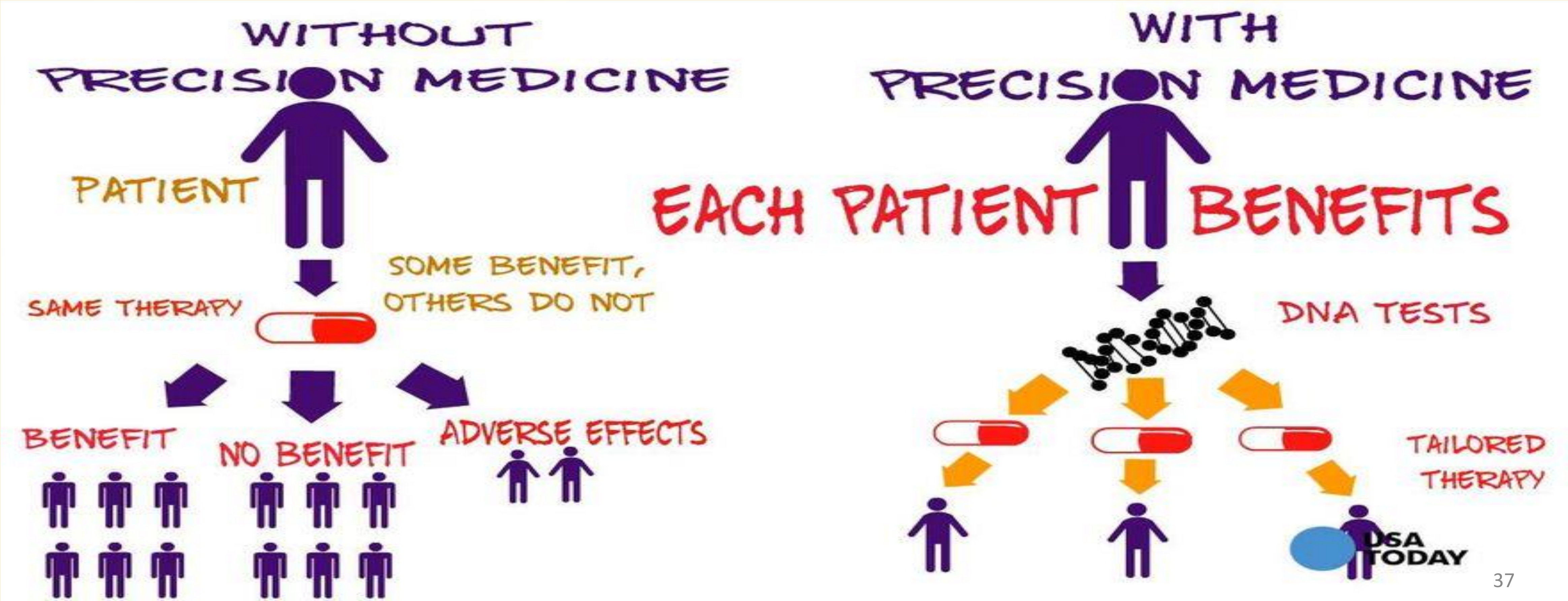
Precision Language Education

Precision language education 01

Precision language education is an extension of the rhizomatic paradigm. It addresses the solution component of students' personal learning needs and is broadly inspired by Precision Education which, in turn, is based on the notion of Precision Medicine

Precision language education 02

This concept (Lian & Sangarun, 2017) is derived in part from "precision education" which, in turn, is derived from "precision medicine".



Precision language education 03

Precision language education attempts to deal with individual learner differences by effecting as precise a diagnosis as possible on each language learner.

This diagnosis then triggers specific interventions designed to target and respond to each person's specific language-learning problems.

Precision language education 04

This implies conducting increasingly accurate, often interdisciplinary, research to develop systems capable of responding to learners' individual needs or optimizing group experiences by tapping into shared learning mechanisms.

Some of these precision-based systems will be technological in nature or depend on technological support. They will be of special relevance in the ASEAN mass market where the number of learners in need of high-level language skills, often at short notice, will rise sharply.

Precision language education 05

Let me give you an example from a study mentioned in the verbotonal section of this talk. Dr. Wen Fengwei performed a study relating to the pronunciation of six English vowels in three contrasting pairs.

He established what are known as the “corrective optimals” of the six vowels concerned – the set of auditory filter settings enabling the correct pronunciation of the sounds in question.

Imagine that a Mandarin-speaking Chinese English language learner is having difficulty distinguishing between [ɪ] as in ***ship*** [ʃɪp] and [i:] as in ***sheep*** [ʃi:p] at the production level (and likely at the perception level). This is hindering intelligibility and proving bothersome in communication.

Precision language education 06

The procedure for helping the student is quite simple.

The student is exposed to the filtered sounds/words and then repeats the sounds/words. An assistant/teacher judges which of the optimals results in the best production of [ʃɪp] (ship) and other words/sound sequences containing the target sound [ɪ].

The same procedure is followed for the contrasting sound [ʃi:p] (sheep).

Precision language education 07

For the sound [ɪ] (ship), optimals are distributed as follows:

- 89.2% of learners favour the following discontinuous filter settings (0–320 Hz + 2,419–3,048 Hz – centre frequency: 2,715 Hz) and
- 10.8% of learners favour the following discontinuous filter settings (0–320 Hz + 1,815–2,286 Hz – centre frequency: 2,037 Hz) and

Precision language education 08

For the sound [i:] (sheep), optimals are distributed as follows:

- 86.5% of learners favour the following discontinuous filter settings (0–320 Hz + 4,838–6,096 Hz – centre frequency: 5,431 Hz) and
- 10.8% of learners favour the following discontinuous filter settings (0–320 Hz + 4,567–6,459 Hz – centre frequency: 5.431 Hz) and
- 2.7% of learners favour the following discontinuous filter settings (0–320 Hz + 4,435–5,588 Hz – centre frequency: 4,978 Hz).

Precision language education 09

At the end of the diagnostic session, the student is provided with two sets of optimal frequencies tailored to their own perceptions, one for [ɪ] and one for [i:]. They are then directed to simple listen and repeat and other exercises that have been optimised for their hearing and spend some time refining their perceptions and productions of the words [ʃɪp] (ship) and [ʃi:p] (sheep) as well as the contrast between the sounds [ɪ] and [i:] in various contexts.

Precision language education 10

This approach was tested in a highly controlled experiment where a control group underwent exactly the same treatment as the experimental group except for the filtering.

The size of learners' improvement in the experimental group was up to 600+% the size of learners' improvement in the control group.

Precision language education 11

This is only one example of precision at work. Another example might include something completely different such as helping students' listening comprehension by providing individualized feedback on the basis of their attempts to transcribe a listening passage.

Precision language education 12

When used in conjunction with a rhizomatic system, the rhizome reveals problems in more detail and more accurately than traditional systems.

It then passes them on to precision language education for remediation. Both are part of the same precision mindset.

Precision language education 13

Looking slightly into the future, it is possible to envisage a scenario where the diagnostic phase could be entirely computerized.

This would require the use of Artificial Intelligence techniques, specifically machine learning and deep learning.

This would remove human intervention completely from the equation providing more flexibility for the student and releasing teachers to perform other important duties.

Precision language education 14

Precision language education is a simple concept although it requires a special mindset.

The difficulty with precision language education lies in the fact that we need to conduct a great deal of research in many fields, e.g. education, psychology, linguistics and this may take some time to grow.

It may also require us to venture into fields with which we are unaccustomed, e.g. neuroscience, computing. Yet that seems to be the future of the field.

This brings us to the end of our little journey.

If you had not heard about these three approaches, I hope that you enjoyed discovering them, albeit briefly and

If you did know about them that, hopefully, there was something of interest in my descriptions.

Thank you for listening to me

Three language-learning approaches you probably didn't know existed

Professor Andrew Lian
Ho Chi Minh City Open University, Viet Nam
Suranaree University of Technology, Thailand
Professor Emeritus, University of Canberra, Australia

THANK YOU!

SEAMEAO RETRAC

CURTIN UNIVERSITY

For the privilege of speaking here today!

It is a great honour!

Why choose this title?

Finding interesting titles for keynote addresses is often a bit of a challenge.

I do a lot of work with computers and watch a lot of videos on YouTube relating to them. I often come across titles similar to: *10 Amazing websites you didn't know existed* or *10 Secret websites you've never heard of before*. So, I thought I'd give it a go with some approaches that most of my doctoral students have never heard of.

Of course, I don't really mean that no one will know of the existence of these approaches, especially if they are teaching in universities.

Rather, I am guessing that many of you will, in fact, know these approaches, but that maybe more will not. I suppose we will find out.

So… let's begin…

The first approach is…

Rhizomatic Learning

Rhizomatic learning 01

Rhizomatic learning comes out of French postmodern philosophy and is based on the work of Gilles Deleuze and Félix Guattari *(A thousand plateaus, 1980).*

I will spare you the philosophy, but suffice it to say that rhizomatic learning is characterized by

the creation of a learning environment designed to elicit and solve the moment-to-moment problems encountered by each individual learner as they attempt to complete BIG tasks not unlike those of task-based learning or project-based learning.

Rhizomatic learning 02

There is no detailed curriculum (except for the triggers provided by the BIG tasks),

no compulsory activities, no advance organisers, no specific vocabulary, no verb tenses, no prepositions, no discourse structures and so on.

Everything that needs to be learned will be learned along the way as it is needed by students in the process of solving the big tasks that they are undertaking and who have a need. At those moments, motivation is high.

These big tasks come in many forms and are the “curriculum-starters” for the learning programs undertaken by learners. An example: make a video simulating a day on French television.

Rhizomatic learning 03

The big questions set the learning context. Actual learning sequences are determined by each student as they grapple with the unpredicted and unpredictable difficulties that they encounter and want/need to correct.

Thus, each student's path to success, the sequence of activities they undertake, their personal learning environment, is likely to be different from that of his/her colleagues (if any) and will, in essence, form an individual syllabus *post facto*.

The rhizomatic structure does not pre-determine activities but can list, track and describe them after the fact. That information can then be made available to learners, teachers, educational institutions etc., and can serve for personal improvement and form the core of many research projects.

Rhizomatic learning 04

For greatest success, such a system will require access to as many resources as possible, ideally resources tailored for the needs of learners.

For that to happen under the best circumstances, students' learning patterns will need to be researched in detail – it will have to become a priority for the field – we will see some related examples later.

In this way, we can be sure that, to the extent possible, we are addressing students' real needs rather than their needs as imagined by themselves or by their teachers.

Rhizomatic learning 05

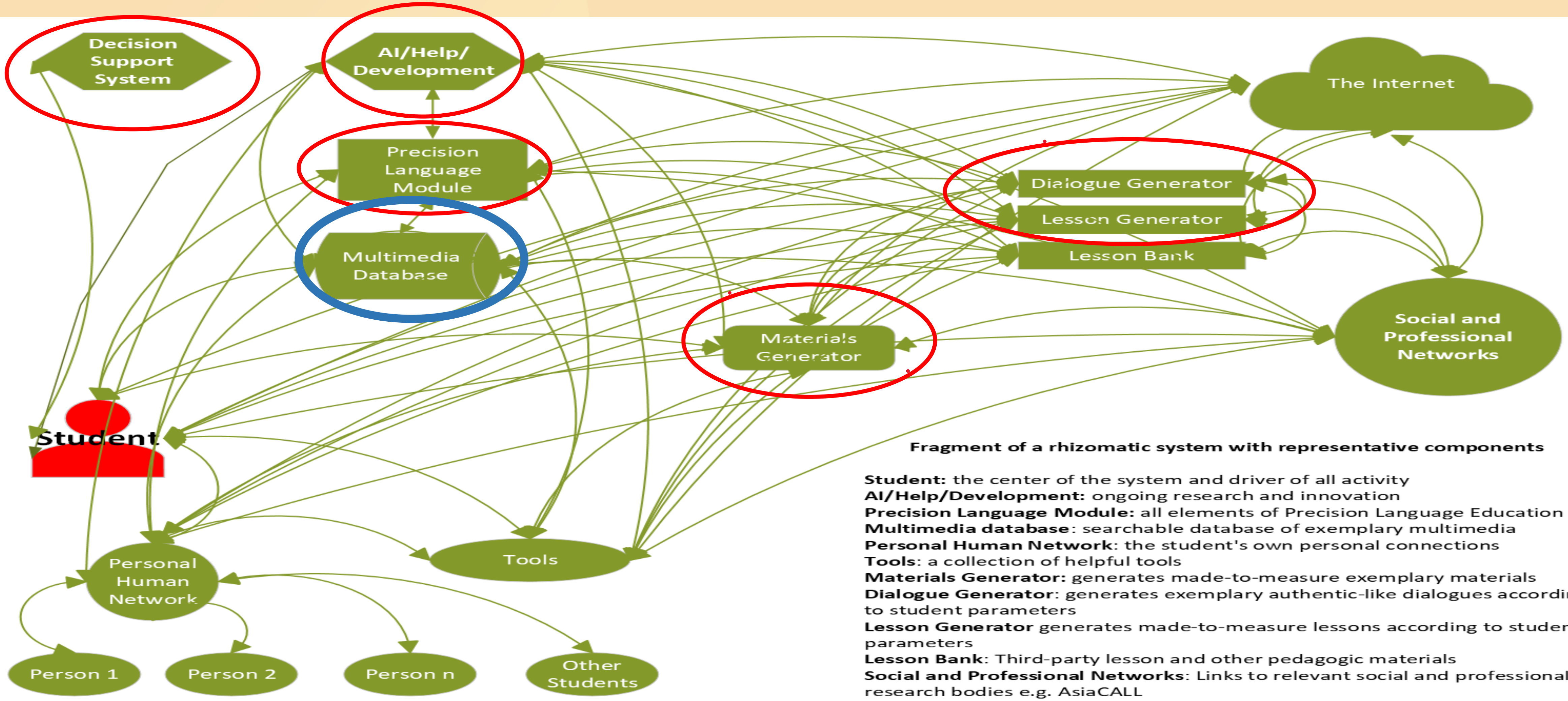
How will students realize that there is a problem? When it is clear to them that there is something they cannot do OR

When someone or something tells them that they are not performing well.

They can then turn to the available learning infrastructure to create a path for themselves. Ideally, technology will play a major role here (but much research remains to be done). Note that teachers form part of the learning infrastructure. They are not excluded.

Something like the picture in the following slide.

Rhizomatic learning 06



Fragment of a rhizomatic system with representative components

Student: the center of the system and driver of all activity
AI/Help/Development: ongoing research and innovation
Precision Language Module: all elements of Precision Language Education
Multimedia database: searchable database of exemplary multimedia
Personal Human Network: the student's own personal connections
Tools: a collection of helpful tools
Materials Generator: generates made-to-measure exemplary materials
Dialogue Generator: generates exemplary authentic-like dialogues according to student parameters
Lesson Generator generates made-to-measure lessons according to student parameters
Lesson Bank: Third-party lesson and other pedagogic materials
Social and Professional Networks: Links to relevant social and professional/ research bodies e.g. AsiaCALL
The Internet: The Internet
NB. All materials can be assembled by educational institutions or students

Rhizomatic learning 07

Can learners solve their own problems?

If the infrastructure is good and the learners are engaged, then the majority of problems will be solved as help is plentiful – e.g Parnkul study, Chaiwiwatrakul study.

Also, Sugata Mitra (hole in the wall, SOLEs).

And remember that teachers are not excluded from the infrastructure, so advice can be obtained if needed.

Rhizomatic learning 08

Advantages:

True individualization – more effective learning

Better utilization of people and resources etc – greater flexibility

Learners become more autonomous

Rhizomatic learning 09

Disadvantages:

Contradicts current classroom/syllabus-based practices

Possibly more costly unless funds are diverted from current models

Unpredictable in terms of time etc…

Administrators may perceive as chaotic and disorderly

Educational reform required (in more than languages)

More research needed

Just in case you think this is unusual 01

This is exactly what we do spontaneously when we need to solve a problem in today's technologically-supported world.

Furthermore, nowadays, our technology-smart society expects personalized solutions. What do we do when our printer breaks down?

We go to Google or YouTube where we are presented with some choices.

We select one of these choices or modify it and then apply it, according to our understandings, to our own printer in an experimental manner.

If the solution works, we are happy. If it does not, we consult with others of increasing expertise until we find a solution that does work.

This is the essence of rhizomatic intervention, and we engage in this activity all the time.

Just in case you think this is unusual 02

We just don't call it rhizomatic, we call it finding a solution for ourselves on the Internet and we do not claim that it is a form of education.

And yet it is a form of education – we have learned a great deal from our Google/YouTube experience.

We have been conditioned to accept that education must be regulated and government-controlled, that it must have an approved syllabus that it must comply with a set of regulations, also approved, and that any form of education that is not so regulated is suspect and bad.

And that governments/teachers etc. know best.

And by the way…

There actually are educational systems that mirror rhizomatic learning

Sugata Mitra's Self-Organizing Learning Environments (SOLEs) and

The Sudbury Valley school system, amongst others and

There are several published studies from SUT and other places which show successful outcomes for rhizomatic approaches.

The second approach is

Verbotonalism

Verbotonalism 01

Verbotonal Theory or

Verbotonalism

Professor Petar Guberina, University of Zagreb

Has tended to be dormant for many years but revived in recent research at Suranaree University of Technoology and elsewhere.

Verbotonalism 02

It is a theory of perception with special application to both the hard of hearing and language learners and has been widely used for both though largely invisibly – and also most documents are in French or Serbo-Croat.

Its principles have been applied beyond perception to language learning (badly actually for the most part).

While the theory is heavily used for pronunciation work, it can be thought of as a theory of comprehension as it treats sound recognition as an act of comprehension – not just as a physical signal (the brain makes sense of incoming physical signals and distinguishes between language and non-language sounds).

Verbotonalism 03

Characteristics of verbotonal theory include:

A focus on awareness-raising to circumvent the blockages from our past.

An understanding that phonemes and other language sounds can be recognised on the basis of limited frequency bands (called optimals). Each language sound has a distinctive set of optimals.

Verbotonalism 04

There are native speaker optimals and corrective optimals (for FL learners). Corrective optimals vary from learner to learner although they may form some groupings.

In order to be able to pronounce foreign language sounds, a learner needs to perceive the foreign language optimals correctly – i.e. in a way that enables him/her to pronounce them correctly.

They need to be able to access the critical elements of the sounds in question – and that can be tricky without some awareness-raising help.

Verbotonalism 05

Sounds are not isolated from their linguistic and communicative context

The right brain is of extreme importance in perceiving language sounds – the right brain preferentially processes melodic information.

This characteristic can be used to enable learners to process the foreign language more successfully through the exploitation of melodic information.

Intonation is not separate from phonemes, it is an integral part of all voiced sounds.

Verbotonalism 05

Verbotonalism sees language as a whole-body experience and uses many techniques to enhance language perception and production and to increase awareness of the sounds and prosody of language.

In particular, it uses the technique of “dancing” to the melody of the language which is presented to learners in the form of low-pass filtered samples.

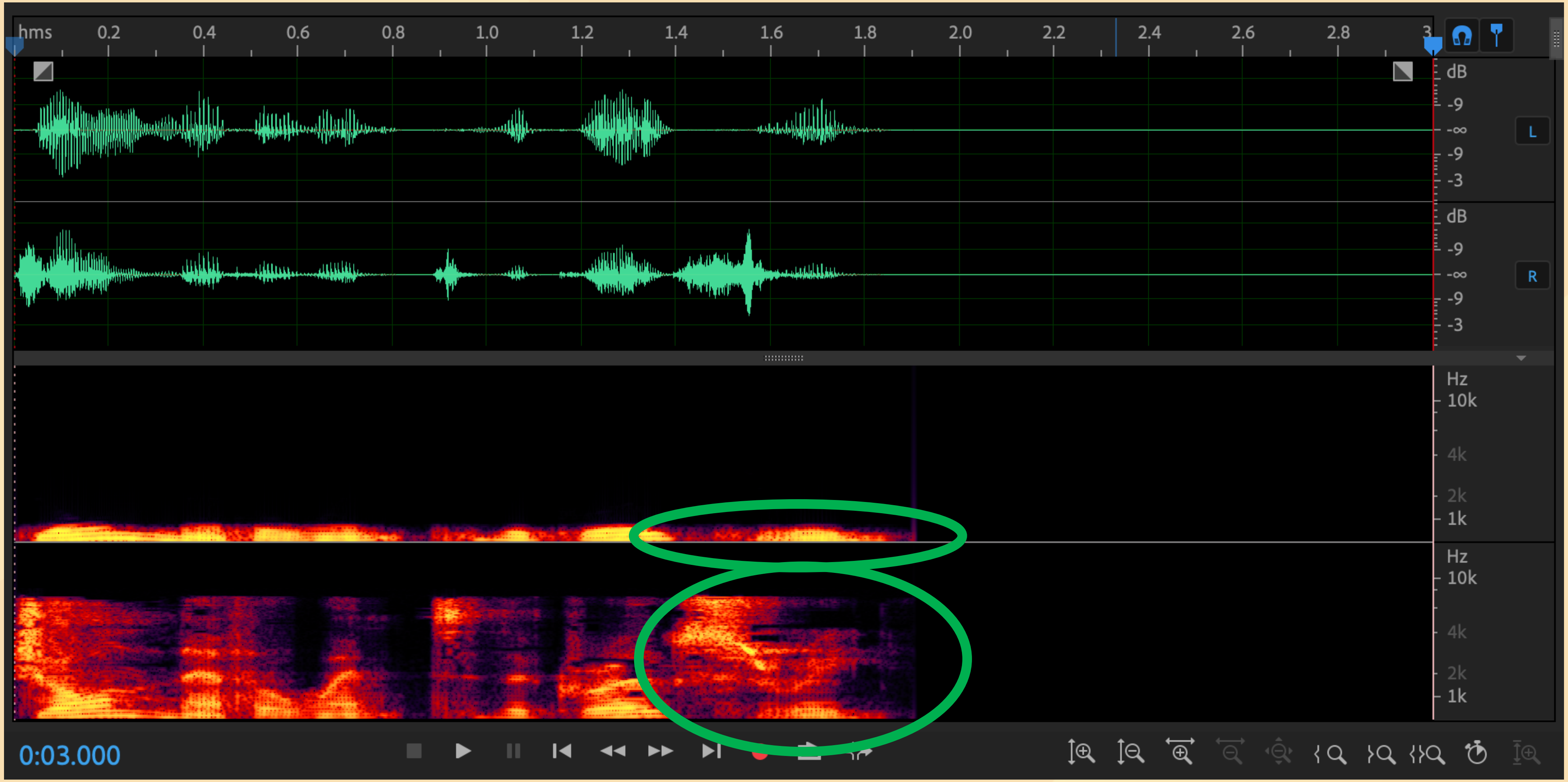
Filtering of the sounds of language is one of the more intriguing aspects of awareness-raising with verbotonalism. Filtering can be applied to both prosody and individual sounds.

Filtering is a process by which an audio signal has certain frequency ranges removed, thus altering the quality of the sound sent to the listener.

Here is an example

Filtered

Unfiltered



Here is an example

e.g. low-pass filtering (<320Hz) highlights the melody of the language (including rhythm, stress and loudness). This can be used to teach intonation.

Low-pass filtering is designed to reveal the intonation and other prosodic features of language. Different filters can be used for other purposes such as helping with individual phonemes. Here is an example of digital filtering (low-pass filtering - < 320Hz - in this case)

Three Recent SUT Studies 01

(a) enhancing the intonation of Chinese university students of English (He et al., 2015; He & Sangarun, 2015). We wanted university graduates to be understood.

(b) enhancing the speaking skills of 8-9-year-old Chinese learners of English (Yang et al., 2017) we wanted children to be understood and also investigated phonological working memory

(c) enhancing the ability of Chinese university learners of English to produce and contrast acceptably, a selection of vowel sounds (Wen et al. 2020).

All three studies focused on intelligibility rather than native-speaker compliance in the spirit of English as a Lingua Franca.

Three Recent SUT Studies 02

The first two studies (Professor Dr. He Bi and Professor Dr. Yang Yan) focused on global characteristics of the language, i.e. intonation, rhythm and other prosodic features

In verbotonal theory, the learning of prosodic features of language precedes the learning of individual sounds. This is because developing correct prosody is expected to automatically develop correct phoneme production. Some sounds may remain difficult and are considered to be residual problems requiring special intervention after prosody has been controlled

The third study (Dr. Wen Fengwei) focused on the production of specific individual sounds. As opposed to the other studies, it involved two phases: a diagnostic phase and a corrective phase

Three Recent SUT Studies 03

There is no time for detailed explanations here but low-pass filtering, because it is highly melodic, is believed to impact directly on the right hemisphere of the brain which is good at processing melody. Thus, for prosody training, listening to filtered language will have a much greater impact than listening to natural language.

One of the basic principles of verbotonal theory is that in the case of pronunciation (and perhaps other areas too) if you provide the learner's brain with the right kind of physical signal then the brain will do the rest and perceive and produce better.

Because the work is done unconsciously by the brain, there is no need for intellectualization e.g. reference to articulation diagrams, or how to hold your mouth, lips etc. There is also no need for motivation – just doing it is enough

Three Recent SUT Studies 04

All three experiments involved only listen-repeat activities. There was no recording of voices and no comparing with native speaker models.

There was no actual teaching of anything by a teacher other than pointing out connections between intonation or sound patterns and intonative functions or meanings of words (if unknown) – same as the control group. Otherwise, a human was present to organize the session and make sure the students followed basic instructions on how to listen and how to “dance” (only for the first two groups). All groups had both in-class and out of class activities.

Three Recent SUT Studies 05

All experiments were successful, with highly significant statistical results (often $p < 0.0001$) with tightly controlled variables and double-blind ratings – performing many times better than the control groups. With the children, phonological working memory also grew – leading, in principle, to more efficient processing of spoken language.

Sometimes results were surprising and unexpected e.g greater fluency

The biggest surprise was that students improved significantly despite the lack of teacher intervention.

Basically, improvements happened only through exposure to specially-treated auditory signals (sometimes enhanced with gesture).

In other words, as hypothesized, once the right signals were sent, the brain actually did all the work automatically

Another experiment 01

This finding led to another experiment carried out by Dr. Cai Xirui at Kunming Medical University (Cai, X., Lian, A.-P., Puakpong, N. et. al. (2021))

Following an experiment that I had done in Thailand using dichotic listening (low-pass filtering in the left ear, normal language in the right ear and vice-versa), Cai investigated brain activity in response to exposure to similarly-configured dichotic signals.

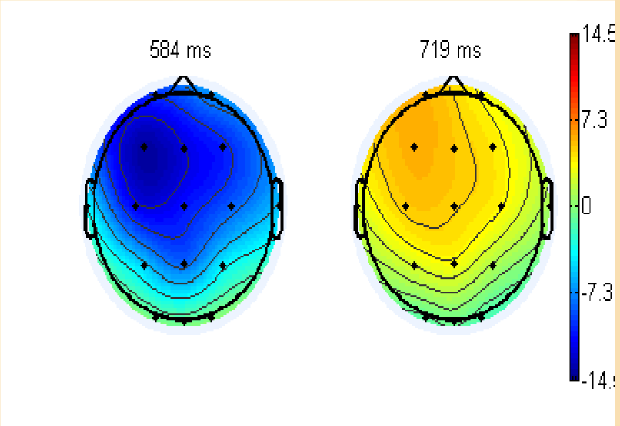
He discovered that Chinese learners of English processed best Left Ear filtered – Right Ear Unfiltered audio signals (load was lightest) and that they processed worst with the opposite configuration, i.e. Left Ear Unfiltered – Right Ear Filtered (load was the heaviest).

This confirmed the hypothesis that sending each brain hemisphere the signals that it best processed facilitated overall processing and that this was better than listening to unfiltered language in both ears.

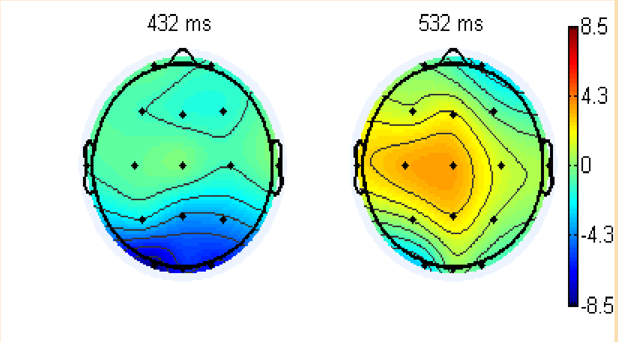
A low processing load means more mental resources are available for other tasks.

Another experiment 02

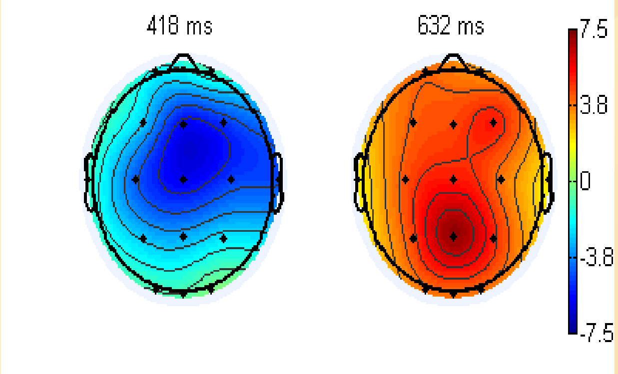
This study was conducted using Event-Related Potentials (electroencephalogram waves) technology



R



FR



FR

Another experiment 03

And fMRI (functional Magnetic Resonance Imagery) technology to track the bloodflow of people in the act of processing the dichotic signals

Another experiment 04

It would seem that exposing language learners to Left Ear Filtered – Right Ear Unfiltered audio signals is a good way of increasing the processing resources available for other things, like making meaning of the signals.

This is a good way of increasing the amount of critical support available for language learning at minimal cost, especially in today's mass market.

In other words, acting on the physical signal itself, something that is never done routinely (if ever), may provide students with a learning advantage.

Currently, a highly controlled double blind experiment conducted by Zhang Shaobing, in China, seems to indicate that mere exposure to a dichotic signal instead of a normal signal provides a significant advantage for developing speaking skills.

We currently have FonF and FonFs. Now it looks like we may be entering a new era of FonPh or Focus on the Physical. More experiments are certain to follow.

The third approach is

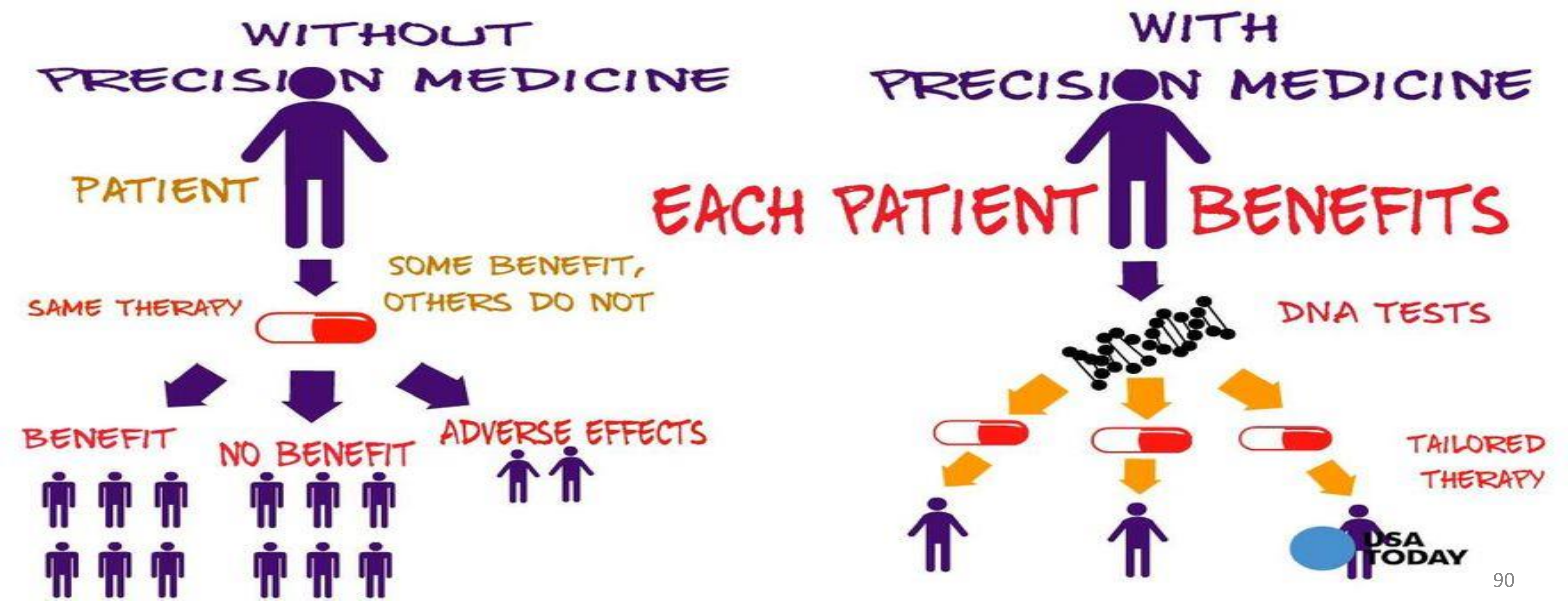
Precision Language Education

Precision language education 01

Precision language education is an extension of the rhizomatic paradigm. It addresses the solution component of students' personal learning needs and is broadly inspired by Precision Education which, in turn, is based on the notion of Precision Medicine

Precision language education 02

This concept (Lian & Sangarun, 2017) is derived in part from "precision education" which, in turn, is derived from "precision medicine".



Precision language education 03

Precision language education attempts to deal with individual learner differences by effecting as precise a diagnosis as possible on each language learner.

This diagnosis then triggers specific interventions designed to target and respond to each person's specific language-learning problems.

Precision language education 04

This implies conducting increasingly accurate, often interdisciplinary, research to develop systems capable of responding to learners' individual needs or optimizing group experiences by tapping into shared learning mechanisms.

Some of these precision-based systems will be technological in nature or depend on technological support. They will be of special relevance in the ASEAN mass market where the number of learners in need of high-level language skills, often at short notice, will rise sharply.

Precision language education 05

Let me give you an example from a study mentioned in the verbotonal section of this talk. Dr. Wen Fengwei performed a study relating to the pronunciation of six English vowels in three contrasting pairs.

He established what are known as the “corrective optimals” of the six vowels concerned – the set of auditory filter settings enabling the correct pronunciation of the sounds in question.

Imagine that a Mandarin-speaking Chinese English language learner is having difficulty distinguishing between [ɪ] as in ***ship*** [ʃɪp] and [i:] as in ***sheep*** [ʃi:p] at the production level (and likely at the perception level). This is hindering intelligibility and proving bothersome in communication.

Precision language education 06

The procedure for helping the student is quite simple.

The student is exposed to the filtered sounds/words and then repeats the sounds/words. An assistant/teacher judges which of the optimals results in the best production of [ʃɪp] (ship) and other words/sound sequences containing the target sound [ɪ].

The same procedure is followed for the contrasting sound [ʃi:p] (sheep).

Precision language education 07

For the sound [ɪ] (ship), optimals are distributed as follows:

- 89.2% of learners favour the following discontinuous filter settings (0–320 Hz + 2,419–3,048 Hz – centre frequency: 2,715 Hz) and
- 10.8% of learners favour the following discontinuous filter settings (0–320 Hz + 1,815–2,286 Hz – centre frequency: 2,037 Hz) and

Precision language education 08

For the sound [i:] (sheep), optimals are distributed as follows:

- 86.5% of learners favour the following discontinuous filter settings (0–320 Hz + 4,838–6,096 Hz – centre frequency: 5,431 Hz) and
- 10.8% of learners favour the following discontinuous filter settings (0–320 Hz + 4,567–6,459 Hz – centre frequency: 5.431 Hz) and
- 2.7% of learners favour the following discontinuous filter settings (0–320 Hz + 4,435–5,588 Hz – centre frequency: 4,978 Hz).

Precision language education 09

At the end of the diagnostic session, the student is provided with two sets of optimal frequencies tailored to their own perceptions, one for [ɪ] and one for [i:]. They are then directed to simple listen and repeat and other exercises that have been optimised for their hearing and spend some time refining their perceptions and productions of the words [ʃɪp] (ship) and [ʃi:p] (sheep) as well as the contrast between the sounds [ɪ] and [i:] in various contexts.

Precision language education 10

This approach was tested in a highly controlled experiment where a control group underwent exactly the same treatment as the experimental group except for the filtering.

The size of learners' improvement in the experimental group was up to 600+% the size of learners' improvement in the control group.

Precision language education 11

This is only one example of precision at work. Another example might include something completely different such as helping students' listening comprehension by providing individualized feedback on the basis of their attempts to transcribe a listening passage.

Precision language education 12

When used in conjunction with a rhizomatic system, the rhizome reveals problems in more detail and more accurately than traditional systems.

It then passes them on to precision language education for remediation. Both are part of the same precision mindset.

Precision language education 13

Looking slightly into the future, it is possible to envisage a scenario where the diagnostic phase could be entirely computerized.

This would require the use of Artificial Intelligence techniques, specifically machine learning and deep learning.

This would remove human intervention completely from the equation providing more flexibility for the student and releasing teachers to perform other important duties.

Precision language education 14

Precision language education is a simple concept although it requires a special mindset.

The difficulty with precision language education lies in the fact that we need to conduct a great deal of research in many fields, e.g. education, psychology, linguistics and this may take some time to grow.

It may also require us to venture into fields with which we are unaccustomed, e.g. neuroscience, computing. Yet that seems to be the future of the field.

This brings us to the end of our little journey.

If you had not heard about these three approaches, I hope that you enjoyed discovering them, albeit briefly and

If you did know about them that, hopefully, there was something of interest in my descriptions.

Thank you for listening to me