



**WELCOME TO THIS WEBINAR
WE WILL START IN A FEW MINUTES**

WELCOME TO THIS WEBINAR

- My name is Valérie Gas
 - Clinical psychologist
 - Tomatis® consultant
-
- All the participants will get the PPT and a link to the recording of the webinar.

The image shows a screenshot of a GoToWebinar interface. The main window displays the following content:

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- new test
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- Choisir une option audio
- Two options: **Audio ordinateur** (represented by a headset icon) and **Appel téléphonique** (represented by a telephone handset icon), separated by the word "ou".
- Language: Français

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TOMATIS[®] FOR PREGNANT WOMEN

December 12, 2017

Valérie GAS

INTRODUCTION



- The sensory capacities of the human fetus in utero, where a philosophical subject until the XIX century.
- The general idea was that the fetus could not hear and that he couldn't be able to hear because his brain wasn't fully developed.
- And yet, Aristotle has already anticipated that “the sensory development was a silent process in the fetus that answered gradually to the outside world in utero”
- In 1877, Charles Darwin suggest that the new born understand very early the feelings of their caregivers thru the intonation of their voices.



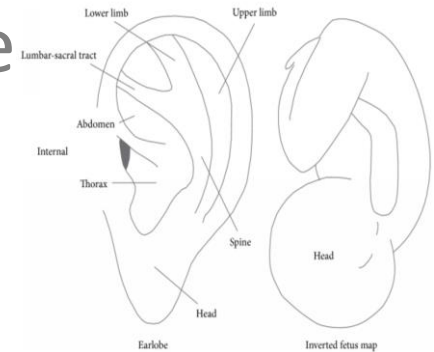
INTRODUCTION



- Its only since the 1960 – 1970 that the Scientific's have been interested in fetal audition.
- The first attempts of analysis of the fetal responses to the sensory stimulations in the field of audition where made by obstetricians.
- Since then a lot of progress in fetal audition has been accomplished and there is today no doubt that there is a certain form of fetal audition.

ALFRED TOMATIS

- Its in 1949, that Alfred Tomatis emits the hypothesis that the fetus perceives the mothers voice.
- Between 1950 and 1955, he will make diverse experiences to understand exactly what the fetus can perceive and the incidences that in utero listening of the mothers voice on the development of the fetus.



ALFRED TOMATIS

- For Tomatis, the mothers voice has two essential functions:
- “Its from the mothers voice considered under its mothering aspect that appears the relational structure upon which the desire to communicate finds its points of supports. It engages the baby to be born in a profound desire to communicate with what’s surrounding him. The fetus doesn’t do a semantic decoding, he is in an emotional, affective decoding.”
- “The intra-amniotic listening of the external sounds show that the prosodic characteristics of language, that is to say its rhythm, tonality, its modulation like the melodies are well preserved.”
- The prosody is the base for the processes of encoding and decoding, which are profoundly anchored in our verbal behavior.

DEVELOPMENT OF THE HUMAN AUDITORY SYSTEM

- The auditory system starts its development after the somatosensory systems (tactile sensibility), chemosensory (olfaction, taste), vestibular and before the visual system.



DEVELOPMENT OF THE HUMAN AUDITORY SYSTEM

- The pinna and the external ear enabling the transmission of the sounds to the middle ear are individualized after 10 weeks of gestation.
- At 7 weeks the Eustachian tube and the tympanic cavity are formed.
- The middle ear, the cochlear system and the vestibule differentiate around 5 to 6 weeks of gestation.
- The tympanic membrane begins at 11 weeks, and at 7 or 8 weeks, the chain of ossicles start growing. The bones of the middle ear have achieved their full size at 32 weeks.

DEVELOPMENT OF THE HUMAN AUDITORY SYSTEM

- In the inner ear, the development of the organ of Corti, seat of the auditory receptors, carries out from the base, area where you find the high frequencies towards the apex, area which analyses the low frequencies. It achieves its morphological development around 10 weeks, to reach its definitive size at 5 months.
- At 12 weeks, you can already identify on this structure the two types of hair cells, the inner hair cells a little more premature than the external ones. The synapses and stereocilia of the internal hair cells present respectively an adult aspect around 15 to 22 weeks, while for the external hair cells it will be the same around 8 months.
- At 12 weeks pregnant, the skeleton is made of firm tissue called cartilage, which will now begin to develop into bone. This hardening process takes a long time and will be fully achieved around twenty years old.

DEVELOPMENT OF THE HUMAN AUDITORY SYSTEM

- From 22 weeks, the cochlear structures have reached a state that suggest that the selectivity in frequencies is already possible.
- The cochlear maturity is achieved around 28 to 30 weeks of amenorrhea.
- The functional maturity of the cochlea is achieved around 28 to 30 weeks.
- The auditory nervous pathways are functional up to the cortex from 24 to 25 weeks, much before having finished their myelination that starts in the second half of gestation and continues until the age of two years.



DEVELOPMENT OF THE HUMAN AUDITORY SYSTEM

- In total, the anatomical structures are all into place between the fourth and the fifth month of pregnancy. The maturation of the inner ear is achieved around the 8 month.
- The integrity of all the auditory system is necessary for audition. However, some auditory capacities could be attributed to a sub cortical process that can explain, for example, the reactivity of the anencephalic fetus to external stimulations.



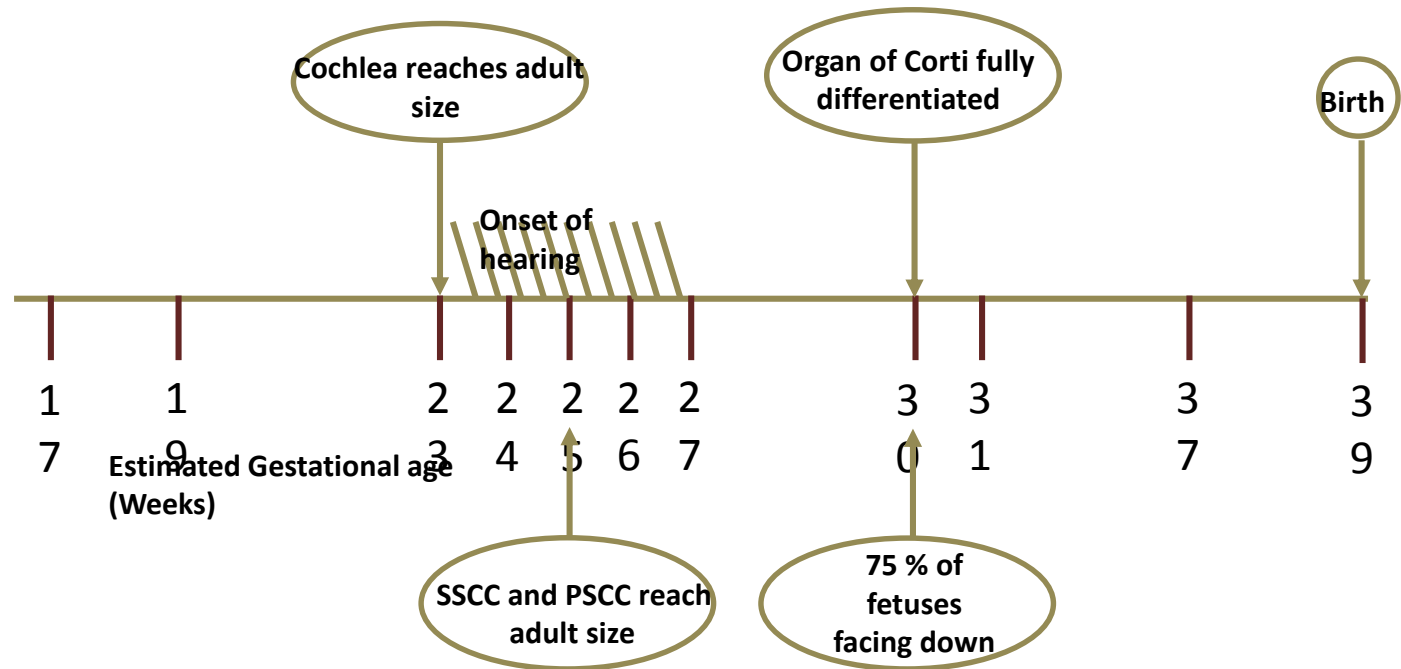
FETAL AUDITION

- From half of the gestation period (22 weeks), the auditory system of the fetus, has on the peripheral and central level, an anatomical development sufficient, to be activated by specific stimulations.
- The prenatal auditory functioning can exert effects at different levels: structural, functional and behavioral. This way the fetal brain is able to acquire and to retain the characteristics of the stimuli present in the fetal environment and its retention can be shown before and after birth.

FETAL AUDITION

- Hearing starts in human beings between the 26 and 28 weeks of amenorrhea, after the axonal myelination and achieves its full development between five and ten years of life.
- Fetuses start reacting on a physical level as early as 14 weeks of pregnancy.
- It seems, that the girl fetuses answer earlier to acoustic stimulus than boy fetuses.

FETAL AUDITION



SSCC: Superior Semicircular canals – PSCC: Posterior Semicircular canals

VESTIBULAR SYSTEM

- A few words concerning the vestibular system in the development of the fetus.
- There is not much information on this topic.
- The vestibular system start developing very early in utero.
- For Tomatis “The cochlea is an extension of the vestibule, the archaic part of the system”.
- The different sensory systems, of whom the vestibule is part, are going to stimulate the neuro-cognitive and the neuro-emotional development of the fetus.
- The vestibule is a dynamo that maintains the neurological dynamics during pregnancy.

VESTIBULAR SYSTEM

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- For Tomatis “The cochlea is an extension of the vestibule, the archaic part of the system”.
- Thru the vestibular system, “the fetus adapts to the rhythm, intonations and moods of his mother. He is in resonance with her and shares her difficulties.”
- “The fetus reacts to the unpleasant or pleasant aspect of the vocal emission of the mother”.

VESTIBULAR SYSTEM

- Stress, tensions, communication problems, create hormonal releases that will reach the fetus.
- The relaxing effects of the sounds is done thru the perception of the mother, her relaxation and the positive effect of the maternal relaxation on the development of the fetus brain.

THE NATURAL SOUND ENVIRONMENT OF THE FETUS

- The auditory system is functional from the third trimester of gestation.
- Research has shown that the mother voice and the sounds produce by the organs have an important place in the fetal sonic environment.
- The placental sounds are predominant in the internal background noises compare to the heart bit of the mother.
- The average level of sound in the placenta is 28 dB.

THE NATURAL SOUND ENVIRONMENT OF THE FETUS

- The sounds coming from the outside environment are important. The voices are perceptible. The prosody of the words and their phonetic characteristics are preserved.
- The levels of sound pressure are not equal in the interior of the amniotic cavity, they vary in function of the distance compare to the sounds source.
- The mothers voice is the more intense, taking into account its proximity.
- It emerges at 24 dB compare to 8-12 dB for the external voices.

SOUNDS INTO THE FETAL INNER EAR.

SOHMER H, FREEMAN S.

J BASIC CLIN PHYSIOL PHARMACOL. 2001;12(2 SUPPL):91-9.

- After at least 20 weeks gestation, the human fetus in utero is able to hear and respond to external and internal (maternal) sounds. The external sounds are attenuated by maternal tissues and fluids - higher frequencies by about 20 dB, and lower frequencies are only slightly reduced. **The sounds in the amniotic fluid, which completely envelops the fetus, then reach the fetal inner ear by bone conduction.** The sound pressure in the amniotic fluid induces skull vibrations which are transmitted directly into the contents of the cranial cavity (brain and cerebrospinal fluid (CSF)) and from there, presumably by fluid channels connecting them, into the cochlear fluids. A further stage of conductive attenuation is probably involved in this transmission.

THE PATHWAY ENABLING EXTERNAL SOUNDS TO REACH AND EXCITE THE FETAL INNER EAR.

SOHMER H, PEREZ R, SICHEL JY, PRINER R, FREEMAN S
AUDIO NEUROOTOL. 2002 MAY-JUN;6(3):109-16

- The human fetus in utero is able to respond to sounds in the amniotic fluid enveloping the fetus after about 20 weeks gestation. The pathway by which sound reaches and activates the fetal inner ear is not entirely known. ...There is also evidence that sounds reach the fetal inner ear by bone conduction. ...This included studying the auditory responses to sound stimuli of animals and humans under water. **It was clearly shown in all the models that the dominant mechanism was bone conduction, with little if any contribution from the external and middle ears.** Based on earlier experiments on the mechanism and pathway of bone conduction, the results of this study lead to the suggestion that the skull bone vibrations induced by the sound field in the amniotic fluid enveloping the fetus probably give rise to a sound field within the fetal cranial cavity (brain and CSF) which reaches the fetal inner ear through fluid communication channels connecting the cranial cavity and the inner ear.

TRANSMISSION OF SOUNDS IN UTERO

- Since there is no air in the auditory canal and in the middle ear of the fetus, the sounds propagate directly to the inner ear, through liquids and bone, without having to pass by the normal pathway in air conduction, that is to say the outer and middle ear.
- The fetal audition has often been compared to the one of persons having a transmission deafness with an auditory sensitivity which is highly reduced, 30 dB SPL (Sound Pressure Level) average. In this pathology, the chain formed by the eardrum and the ossicles can not fulfill its function of amplification of the sounds arriving in the auditory canal.
- In an air middle, this amplification is necessary because sounds are subject to an important loss of energy in the passage from the air to the liquids contained in the middle ear.

TRANSMISSION OF SOUNDS IN UTERO

- In the case of the fetus, this amplification is useless, the sounds, once in the uterus, are not subject to a noticeable attenuation, because they go from the amniotic liquid to the tissues, to the bone and to other physiological liquids that have almost the same characteristic of sound transmission.
- To obtain a reaction (jump), you need around 110-120 dB of intensity on a fetus at the end of pregnancy, whatever the state of vigilance and you will need an intensity of 80-90 dB on a newborn. With a sound of 90-100 dB SPL, you get a deceleration of the heart beat on the fetus and on a newborn you need an intensity of 65-75 dB.
- The difference, of 25-30 dB SPL more or less, corresponds to the attenuation of the external noises in utero.

TRANSMISSION OF SOUNDS IN UTERO

- Research has shown, that the attenuation of the external sounds is mainly due to the fact that the sound waves are reflected by the maternal abdomen.
- But many noises of everyday life are found in utero, and particularly, all the components of the voice, and they are perceptible for the fetus ear from the 8th to the 9th month.
- Human voice is identifiable and you can even differentiate each speaker of a conversation.
- The mans voices rise more difficultly from the placental sounds, compare to women's voices, since they are lower and closer to the sounds in utero.
- If the voices are well perceived, what is said is very badly understood or not at all.

TRANSMISSION OF SOUNDS IN UTERO

- For the fetus, the mothers voice is stronger and more perceptible than all the other voices, because the conduction goes thru the body of the mother, from the abdominal tissues to the amniotic liquid thru the intermediary of the spinal cord and the pelvis.
- It is thought that the fetus feels the sound, because the sound waves of the voice create minor pressures, on the eardrum and the skin, so that the vibrations are at the same time felt and perceived.

TRANSMISSION OF SOUNDS IN UTERO

- The relation between hearing and touch is probably much more important than we imagine, with huge psychological implications, that could maybe explain the intimate link between mother's voice and secure attachment.
- Newborns are very sensitive to the mother's voice and it seems that this capacity results from the exposure in utero to the particular prosody of the mother when she expresses different feelings. When the mother speaks with anger, her breathing, her heart beat, and her degree of muscular tension, as the movement of her diaphragm, change, so the fetus doesn't only hear the wrathful voice of the mother: he feels it.
- What is even more astonishing, is that this capacity to distinguish the vocal sounds of different emotions and to react differently in function of them is present just a few hours after birth.

PRACTICAL CONSEQUENCES OF PRENATAL AUDITION

- Studies have shown that the newborn, are incredibly sensitive to others feelings, especially to the feelings expressed by the voice, and particularly to the positive emotions.
- This capacity to decode the acoustic communication of the adults is the beginning, and even maybe the prototype, of all the later learnings.
- In other words, the early comprehension of what our parents feel – happiness, anger, sadness – can be a way to start to develop the emotional intelligence and maybe other types of intelligence.

PRACTICAL CONSEQUENCES OF PRENATAL AUDITION

- All results show, that there is a memorization of the auditory experiences by the fetus, that can influence his sound preferences after birth.
- The fetus can memorize the sound of his mother voice but also more complex sounds (nursery rhymes sung by the mother, stories told by the mother during the pregnancy).
- The research also shows that the fetus integrates certain acoustic elements and particularly prosodies.
- A preference for the mother tongue has been observed after two days of life.
- Some research has shown a capacity of discrimination between two languages with recognition of the mother tongue by newborns of 2 and 4 days.
- This implicates that the child starts the learning of the fundamental bases of his mother tongue during in utero life.

PRACTICAL CONSEQUENCES OF PRENATAL AUDITION

- It was also shown that the fetus was able to discriminate vowels and differentiate male or female voices.
- The fetuses differentiate also their mothers voices from the voices of stranger women.
- Key conditions are necessary for fetal learning: auditory capacity, detection of noise thru the amniotic environment and the capacity to memorize.
- Some authors have studied the fetal responses in high-risk pregnancies and particularly in cases of very high blood pressure. Subtle differences were noticed in the behavior of the fetus with principally a delay in the reaction to the stimulation.

NEWBORNS' CRY MELODY IS SHAPED BY THEIR NATIVE LANGUAGE

BIRGIT MAMPE, ANGELA D. FRIEDERICI, ANNE CHRISTOPHE, AND KATHLEEN WERMKE
CURRENT BIOLOGY 19, 1994–1997, DECEMBER 15, 2009 ©2009 ELSEVIER LTD ALL RIGHTS
RESERVED DOI 10.1016/J.CUB.2009.09.064

- Cries of 30 French (11 female, 19 male; mean age 3.1 days, range 2–5 days) and 30 German (15 female, 15 male; mean age 3.8 days, range 3–5 days) newborns were analyzed.
- All subjects were healthy, full-term newborns with normal hearing from a strictly monolingual (French or German) family background.
- The observed melody contours of French and German newborns' crying show that they not only have memorized the main intonation patterns of their respective surrounding language but are also able to reproduce these patterns in their own production.

NEWBORNS' CRY MELODY IS SHAPED BY THEIR NATIVE LANGUAGE

- Prosodic features such as melody, intensity, and rhythm are essential for an infant acquiring language.
- There is compelling evidence that infants are sensitive to prosodic features of their native language long before speech-like babbling sounds are uttered or first words are produced.
- Indeed, auditory learning starts as early as the third trimester of gestation, and prosodic features are well preserved across the abdominal barrier, whereas phonetic aspects of speech are disrupted, making prosodic characteristics very salient for the human fetus .
- In newborns, traces of early auditory learning processes are reflected in perceptual preferences for melodies to which they were exposed prenatally

NEWBORNS' CRY MELODY IS SHAPED BY THEIR NATIVE LANGUAGE

French newborns preferentially produced rising (low to high) contours, whereas German newborns preferentially produced falling (high to low) contours (for both melody and intensity contours).

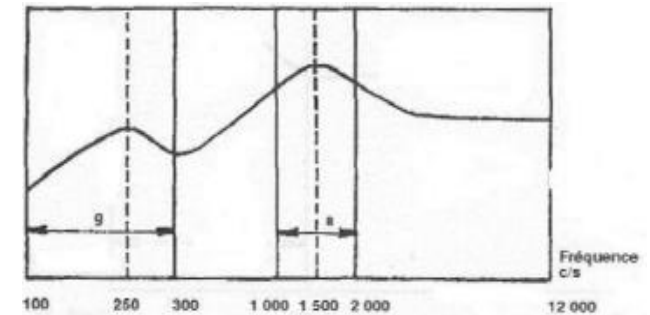
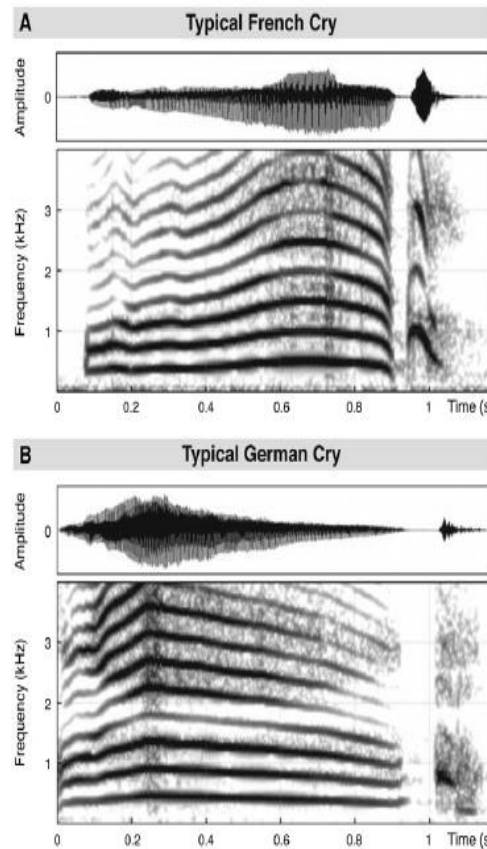


FIG. 6. Courbe française

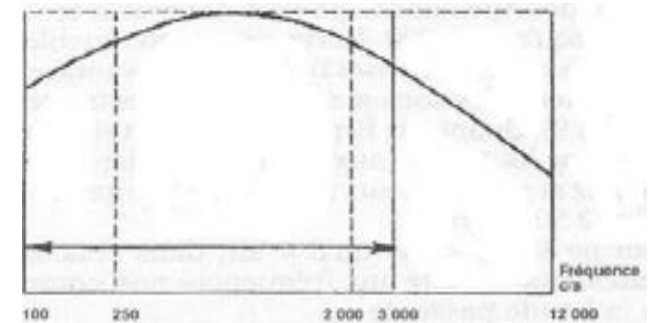


FIG. 4. Courbe allemande

ACCOMPANYING PREGNANT WOMEN

A COMPARATIVE STUDY AT VESOUL AND FOCH,
FRENCH HOSPITALS ODILE SALAÜN, RAPHAEL MICHON

- This study was constructed in order to offer information on the value of the Tomatis® Method for pregnant women.

Women with no special maternal care	Women with a maternal program consisting of breathing, relaxation, birthing pool	Women with a maternal program consisting of breathing, relaxation, birthing pool and the Tomatis® method
254 from Foch	683 from Foch	170 from Vesoul and 53 from Foch

ACCOMPANYING PREGNANT WOMEN

A COMPARATIVE STUDY AT VESOUL AND FOCH,
FRENCH HOSPITALS ODILE SALAÜN, RAPHAEL MICHON

Results

Cesarean - Forceps	
Vesoul	Foch
Significant fall in the rate of cesarean And in the use of forceps	No significant difference

ACCOMPANYING PREGNANT WOMEN

A COMPARATIVE STUDY AT VESOUL AND FOCH,
FRENCH HOSPITALS ODILE SALAÜN, RAPHAEL MICHON

Results

Positions	
Vesoul	Foch
<p>Out of 170 cases, the rate of seating's passed from 4 % to 2 % when the future mother underwent stimulation under the Tomatis® method</p> <p>The women who followed the Tomatis method were completely relaxed and in that case the turning of the child succeeded at 99 %. The turning is done manually by the doctor. The program favored the muscle relaxation which is indispensable in the case of a turning.</p>	<p>No significant difference</p>

ACCOMPANYING PREGNANT WOMEN

A COMPARATIVE STUDY AT VESOUL AND FOCH,
FRENCH HOSPITALS ODILE SALAÜN, RAPHAEL MICHON

Results

Time of Labor			
Vesoul		Foch	
Rapid birth (less than 3 hours)	17 % of women from the Tomatis® group required less than 3 hours 15 % in the control group 6 % in the traditional maternal care group		
Time of labor	3 hours	Time of dilatation	3 hours
Efforts to expel	15 min	Efforts to expel	15 min

ACCOMPANYING PREGNANT WOMEN

A COMPARATIVE STUDY AT VESOUL AND FOCH,
FRENCH HOSPITALS ODILE SALAÜN, RAPHAEL MICHON

Results

Anesthesia – Peridurale (epidural)			
Vesoul		Foch	
Classical preparation	28 %	Classical preparation	90 %
The mothers who benefited from the Tomatis method, did not want the epidural		Control group	85 %
Tomatis® group	17 %	Tomatis® group	85 %

ACCOMPANYING PREGNANT WOMEN

A COMPARATIVE STUDY AT VESOUL AND FOCH,
FRENCH HOSPITALS ODILE SALAÜN, RAPHAEL MICHON

- Results

State of the Peritoneum		
Vesoul		Foch
Episiotomy	Decrease of 10 %	The results are identical between the women having followed a classical preparation and the Tomatis® 70 % with episiotomy 24 % without episiotomy

ACCOMPANYING PREGNANT WOMEN

A COMPARATIVE STUDY AT VESOUL AND
FOCH, FRENCH HOSPITALS ODILE SALAÜN,
RAPHAEL MICHON

Relaxation

The decrease in the rate of anxiety on the statistical level ifs significant., it passed from 5,73 to 3,95 points.

Other results from the testimonials

Quality of the dreams were peaceful and positive

They did not have the usual feeling of the end of pregnancy of being handicapped

The disappearance of back pain

A normal walk

A better listening

An increase in creativity



ACCOMPANYING PREGNANT WOMEN

A COMPARATIVE STUDY AT VESOUL AND FOCH,
FRENCH HOSPITALS ODILE SALAÜN, RAPHAEL MICHON

Other results from the testimonials

A great, spontaneous interest manifested for the child

The calm of the babies

The well-being of the mothers, following the deliveries, without apprehension of returning to their homes

The quality of the mother/child relation

A better listening

An increase in creativity

ACCOMPANYING PREGNANT WOMEN

A COMPARATIVE STUDY AT VESOUL AND FOCH,
FRENCH HOSPITALS ODILE SALAÜN, RAPHAEL MICHON

FOCH / VESOUL

Decrease of the time of labor of about 45 minutes

The babies also had superior birth weight imputable to a gestational age more advanced (40 to 41 weeks without menstruation)

The APGAR places in evidence that the Tomatis babies recoup faster and better than other babies

The instrumental intervention (forceps, suction cup, spatulas) is less frequent (less than 16 %)

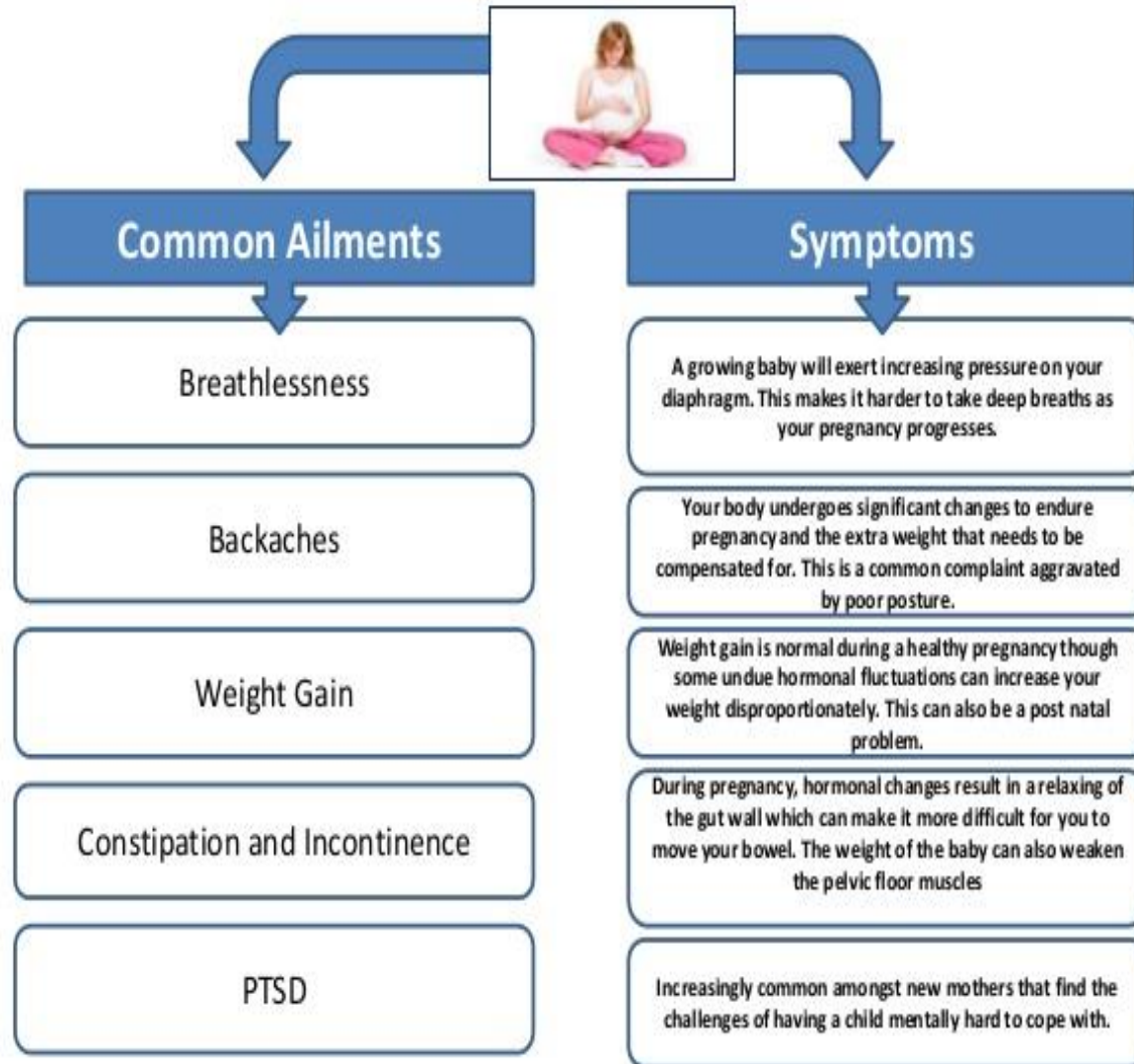
TOMATIS[®] METHOD AND PREGNANT WOMEN

- Women who come to relax, take time for themselves, communicate with their babies.
- Pre-babies anxiety
- Women who have had a miscarriage or lost a newborn, a baby or a child
- Difficult family history
- Stress
- Family problems, couple problems
- Etc.

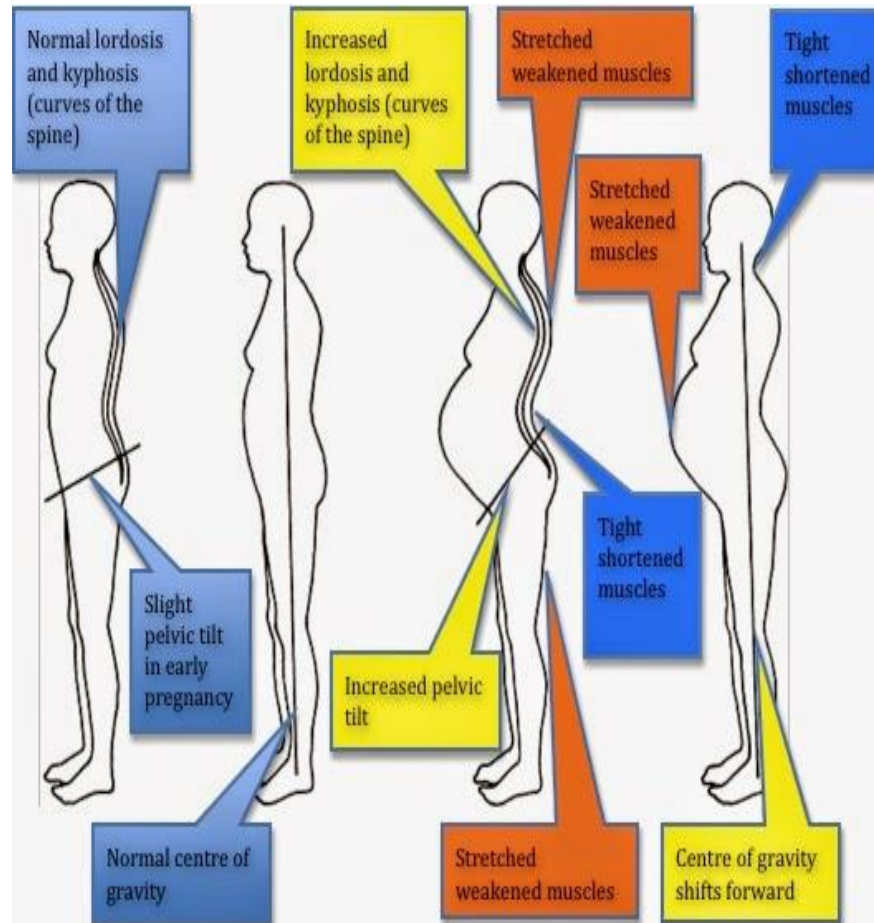
PREGNANCY: COMMON COMPLAINTS

- Morning sickness
- Backaches
- Heartburn
- Breathlessness
- Hormonal changes and imbalances
- Weight gain and edema
- Prenatal and postnatal problems
- Etc.

Problems Associated during Pregnancy and Symptoms



POSTURAL CHANGES



STRESS AND PREGNANCY

- Prenatal stress is one of many factors that can affect the dynamic link between mother and child, with significant impact on fetal development. Maternal stress during pregnancy may profoundly affect the fetus, with lifelong implications to the child's wellness.
- Research has shown that adrenocorticotrophic hormone (ACTH) is released in the fetus in response to stress.
- Additionally, glucocorticoids may pass through the placenta to the fetus with postnatal effects, including birth weight, brain development, and HPA axis function.
- Catecholamine's also play a role; studies have also shown that catecholamine's released in response to the mother's psychological stress affect the fetus by decreasing uterine blood flow.

STRESS AND PREGNANCY

- Sustained high levels of stress and anxiety during pregnancy is one of the major issues of birth and childhood, such as low birth weight and preterm birth, difficulty coping in emotional situations, learning disabilities, attention deficit, and childhood anxiety.
- Too much stress during pregnancy, if not properly managed, can affect the baby's development in a number of ways. Stress, for example, is now recognized as a primary factor in preterm birth as well as a number of other childhood problems.

STRESS AND PREGNANCY

- Stress negatively affects adults, too, but the developing baby is more sensitive to stress than the mother. It can take years for the damages due to stress to show up in an adult, but stress can harm a developing baby in a few months.
- Medicine has come a long way and now better understands that thoughts and emotions, especially stressful ones, actually cause hormones to be released. The hormones enter the bloodstream and communicate the “disease” to specific parts of the body. Ultimately, if the hormones are released frequently and stay in the system too long, they cause known physical problems or diseases, such as insomnia, heart palpitations, or digestive problems.
-
- In sum, we now understand that psycho (in the mind) – somatic (reaction in the body from our thoughts and feelings) is a real phenomenon that can affect our health and longevity.

STRESS AND PREGNANCY

- When cortisol and other stress hormones are active or when your nervous system is in fight-or-flight mode, many normal body functions are put on hold. For instance, growth and reproductive activities are inhibited. There is reduced blood flow to the skin and the immune system is less active. Thyroid function is decreased. Blood sugar is increased. Those are short-term adjustments that your body should perform normally; and your body fully expects to reverse those adjustments the minute a crisis or challenge is over.
- If the cortisol levels continue to be high for too long, physical problems can begin to develop. Having a busy mind all the time can bring on problems like indigestion, trouble falling asleep, being aggravated when you are interrupted while doing something, gaining weight you find difficult to lose, getting startled at an unexpected loud noise, sighing frequently, or even feeling so overwhelmed that you are close to tears.

STRESS AND PREGNANCY

- It is important to understand that the effects of maternal stress can have permanent implications to the infant later in life.

TOMATIS[®] PROGRAM

- In function of the problematics we can start as soon as the pregnancy is known or we can wait until the third month of pregnancy.
- The objectives are variable but the main ones are the followings: posture, anxiety, stress, emotions, self esteem, energy, cortical arousal, consciousness, attention, communication, relaxation, etc.

TOMATIS[®] PROGRAM

- The listening time will depend on the problematic, the fatigue and availability of the mother.
- One thing we clearly don't want is to create stress or even more stress on our client.
- It needs to be discussed with the client, that they have to take time for themselves to do the program. It's a moment for them. It has to be done in good conditions.

LISTENING TIME

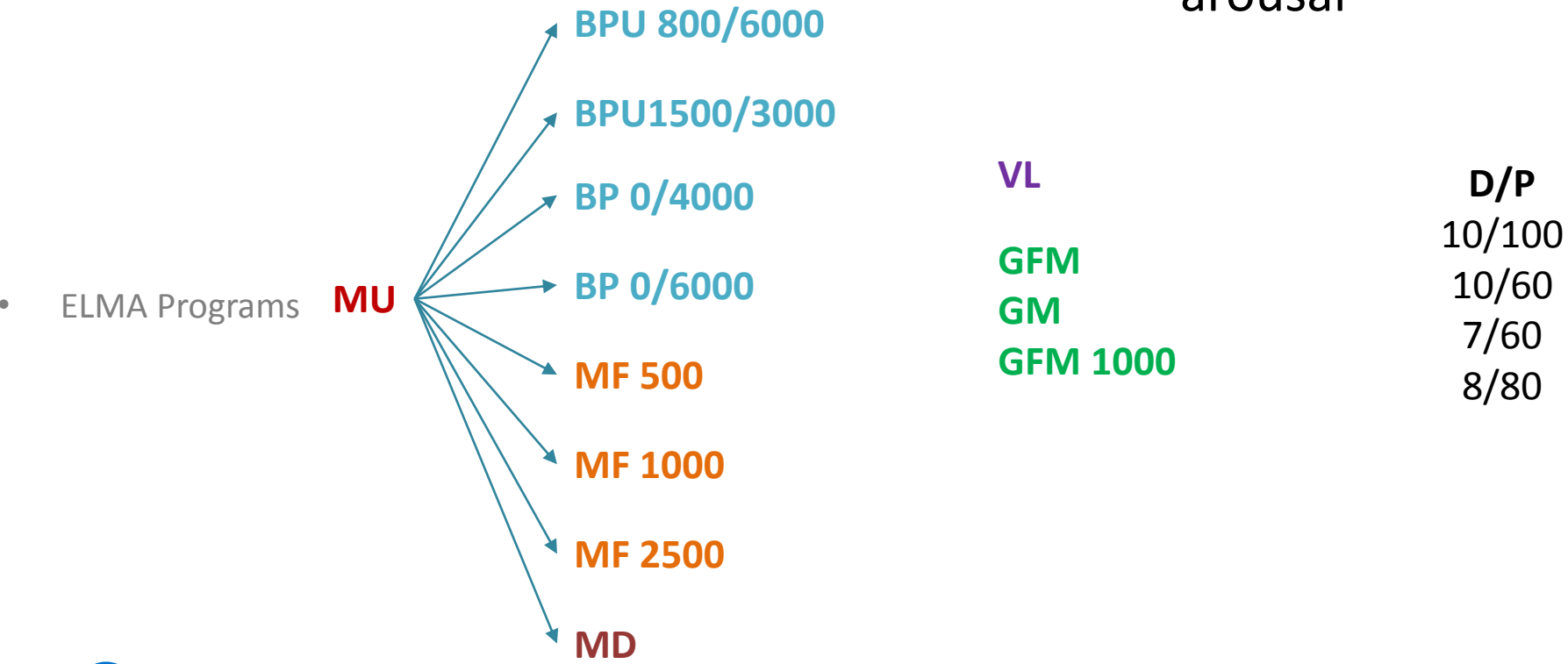
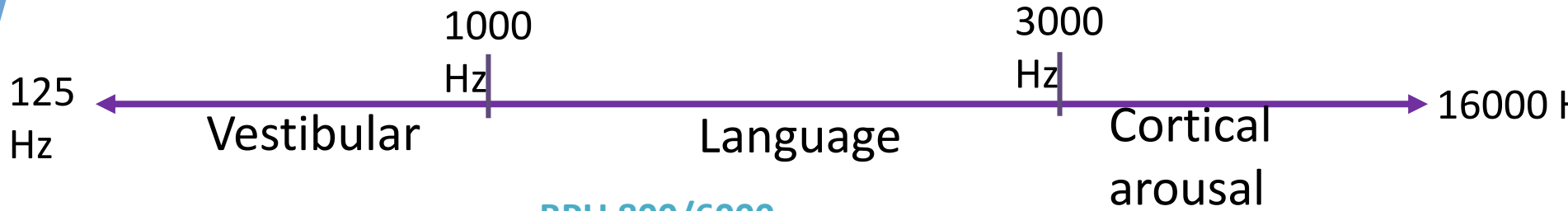
Listening time per day			
10 minutes	15 minutes	20 minutes	30 minutes
10 minutes	15 minutes	20 minutes	30 minutes
10 minutes	15 minutes	20 minutes	30 minutes
10 minutes	15 minutes	20 minutes	30 minutes
40 minutes	1 hour	1 hour 20 minutes	2 hours
22 days = 15 hours	18 / 20 days	14 days = 18h40	10 days = 20 hours

In function of the level of training we have different possibilities

THE THREE ZONES OF THE TEST

Zone 1	Zone 2	Zone 3
125 – 1000 Hz	500 – 4000 Hz	2000 -16000 Hz
3 Octaves in each zone		

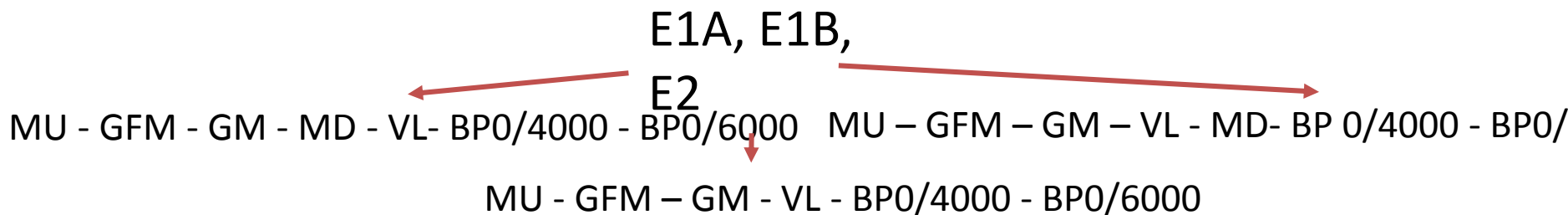
THE MUSIC



PROGRAMMING



- ELMA Programs



SENSORI MOTOR-
EMOTIONAL



PROGRAMMING



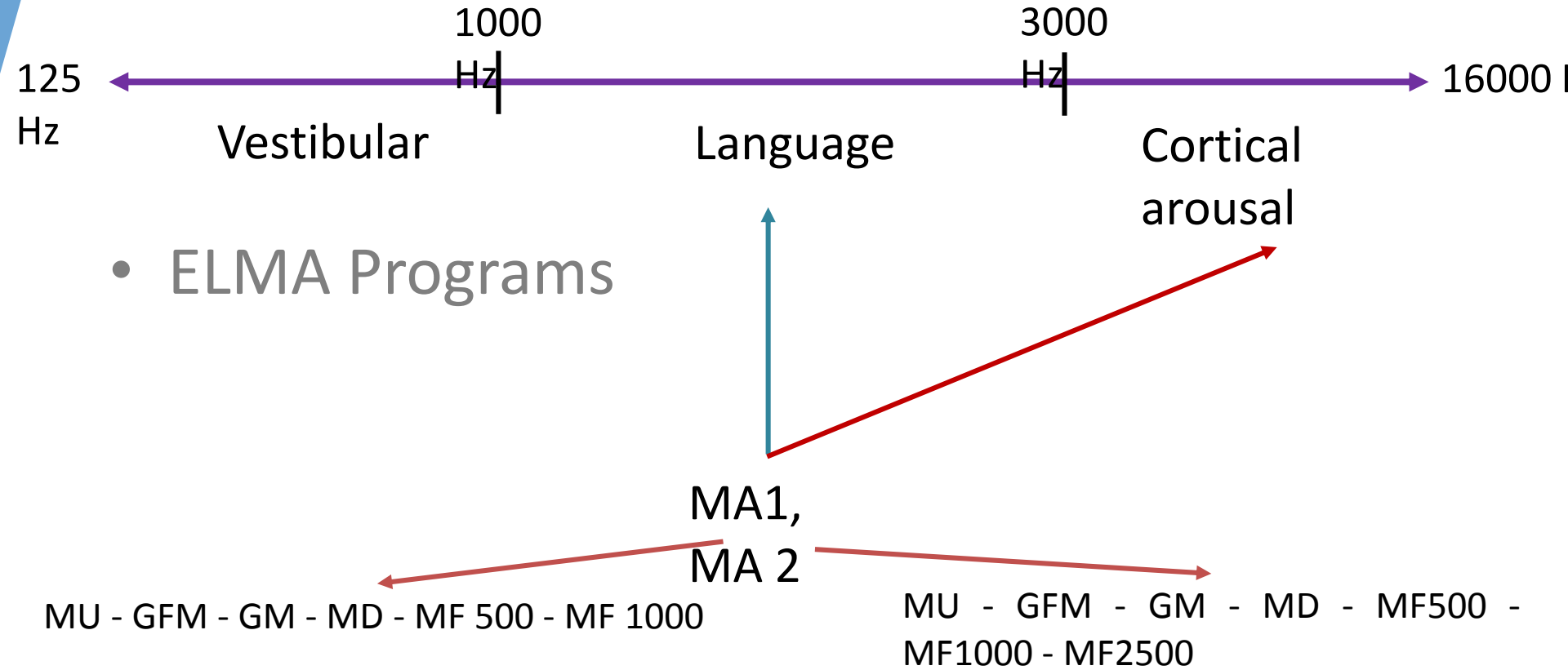
- ELMA Programs



**LINGUISTIC-
COGNITIVE**



PROGRAMMING



LINGUISTIC -
COGNITIVE





THANK YOU

