

Elementary Gestalts for Gesture Sonification

Cristina Fedrigo & Sara Radin

*Multimedia tools for music listening,
representation and learning*

*A gesture sonification system
developed by Maurizio Goina and Pietro Polotti*

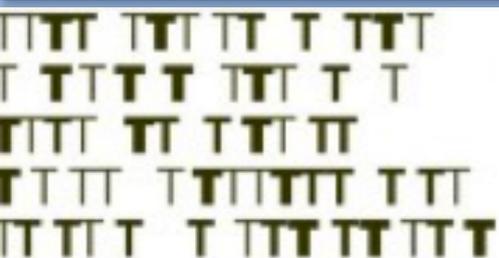
*A crucial contribution as performer and user of the
system was provided by the dancer Sarah Taylor*

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EGGS (Elementary Gestalts for Gesture Sonification)
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Gesture, Sound, Representation

A research project (2010 – 2012)

developed by Conservatory of Music “Tartini” - Trieste

funded by Servizio università, ricerca e innovazione

Regione Friuli Venezia-Giulia

Fondazione Cassa di Risparmio di Trieste

**The project was aimed at testing and developing resources
for multimedia in artistic and pedagogical areas**

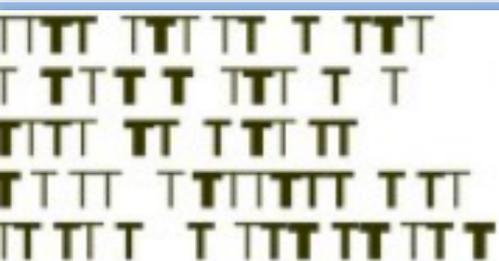
School of Music Education

Prof. Cristina Fedrigo
Researcher: Sara Radin

School of Music and New Technologies

Prof. Pietro Polotti
Researcher: Maurizio Goina

Project coordinator: Prof. Paolo Rodda



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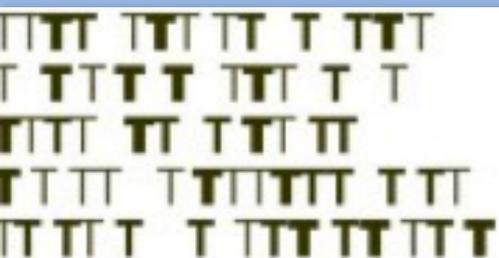
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The relationship with **sound** and its characteristics, is an important foundation for **musicianship**.

We do not know what musicianship is exactly, but we can recognize it, e.g. watching a performance (all levels) where the person who is playing has music competences (even if only a few)

In this contribution we refer to **students**, even if we think that what we highlight generally concerns “**music people**”

We focus our attention on some of the actions which are connected with **the birth of music behaviour as a musicianship indicator**



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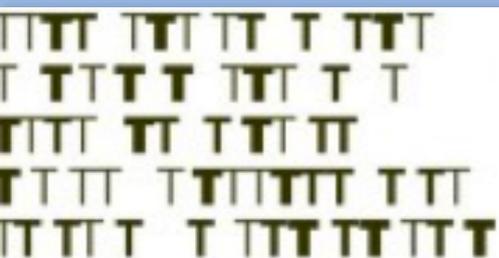
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We define music experiences as musical if, no matter what the level of the student, his/her **performances are managed autonomously**

Autonomy depends on our **awareness** and our **possibility for control** (not merely our knowledge) over what we are doing

There are many crucial aspects at the heart of this autonomy, but often **they are not taught at the beginning of the music study path**

One of these is **managing the sound and listening experience**



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Musicianship begins to grow through a rich, varied and conscious sound experience.

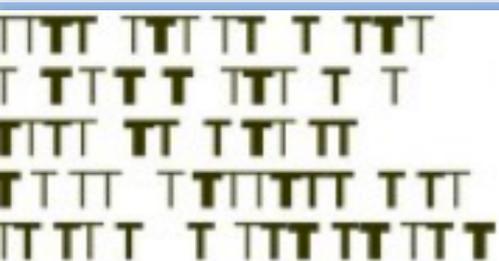
Sometimes our attention, as teachers or educators, does not focus enough on **the relationship with our main music material: sound.**

Sound, its nature, its features/characteristics, are, in many different ways, at the centre of our musical action, practice, learning, listening, communication, participation.

If we do not know and appreciate the experience of sound, the music experience may be emotionally poor, incomplete, or unsatisfying and unclear, or, at worst, unintelligible and difficult to understand.

Sometimes pupils begin to study music but nothing is taught to them about sound in general and their instrument's sound in particular.

Sometimes they do not learn to listen.



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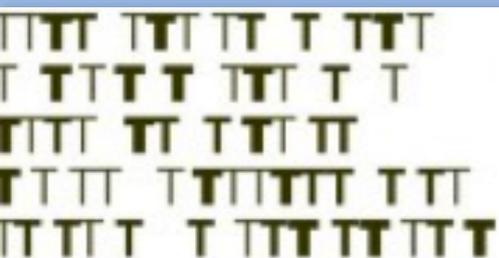
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The problem is the experience of sound, in particular for beginners, to help their musicianship mature through the competence of our main music material

The nature and characteristics of sound are the basis for the processes of creation, and composition of music practices. To improve this rich and fascinating part of music education is a relevant piece of work for researchers and educators.



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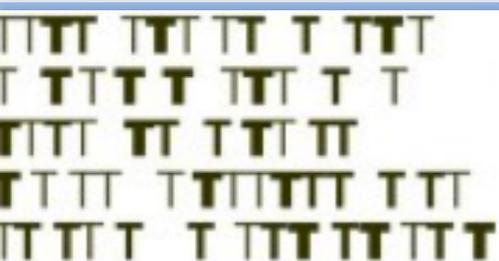


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We focused only on the competences concerned with sound pitch control, by listening while the pupil was participating

The first, simple, elementary pitch information is a structural characteristic not only of sound, but of the music organisation

So it is necessary to develop useful didactics, tools and strategies to consciously manage this aspect of music well from the beginning and improve it throughout the musicianship development process



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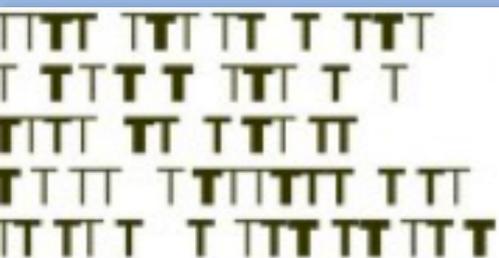
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Where should our conscious use of sound begin? When do we need to know what it means to sing or play with perfect tuning control? When should the student discover the beauty of the sound that he/she can create and perform?

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means to sing or play with perfect tuning control? When should the student discover
Where should our conscious use of sound begin? When do we need to know what it



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The only answer

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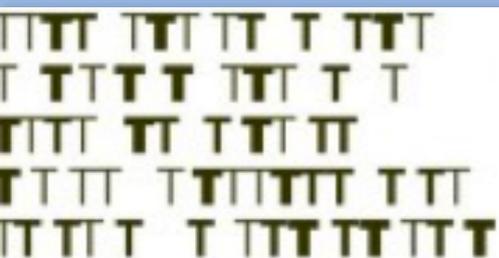
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... from the beginning, using appropriate tools to improve this competence. We hope this research shows, for example, how to use multimedia tools and pure tones to improve our pitch control and awareness

We focused, in this research, only on the competences concerned with sound pitch control, by listening while the pupil was participating

The first, simple, elementary pitch information is a structural characteristic not only of sound, but of the music organisation

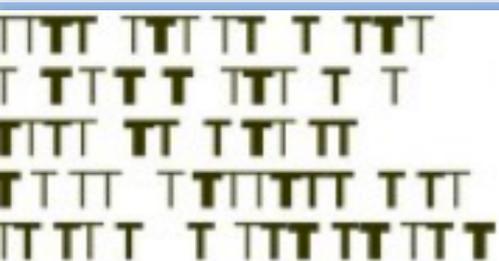


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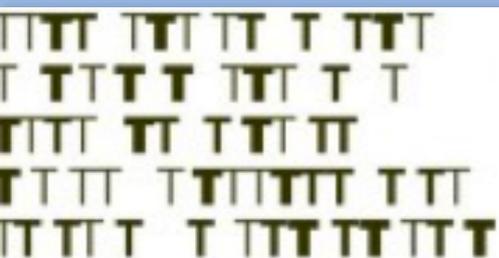
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| NUMBER OF PARTICIPATING CLASSES and STUDENTS | | | |
|---|-----------------------|------------------------|----------------------------------|
| Total Number of Performances: 2049 | | | |
| <u>Class level</u> (Primary School) | <u>Classes</u> | <u>Students</u> | <u>Class Performances</u> |
| I | 20 | 356 | 467 |
| II | 19 | 290 | 324 |
| III | 22 | 403 | 428 |
| IV | 17 | 243 | 485 |
| V | 18 | 294 | 345 |
| <u>Total</u> | 96 | 1586 | 2049 |



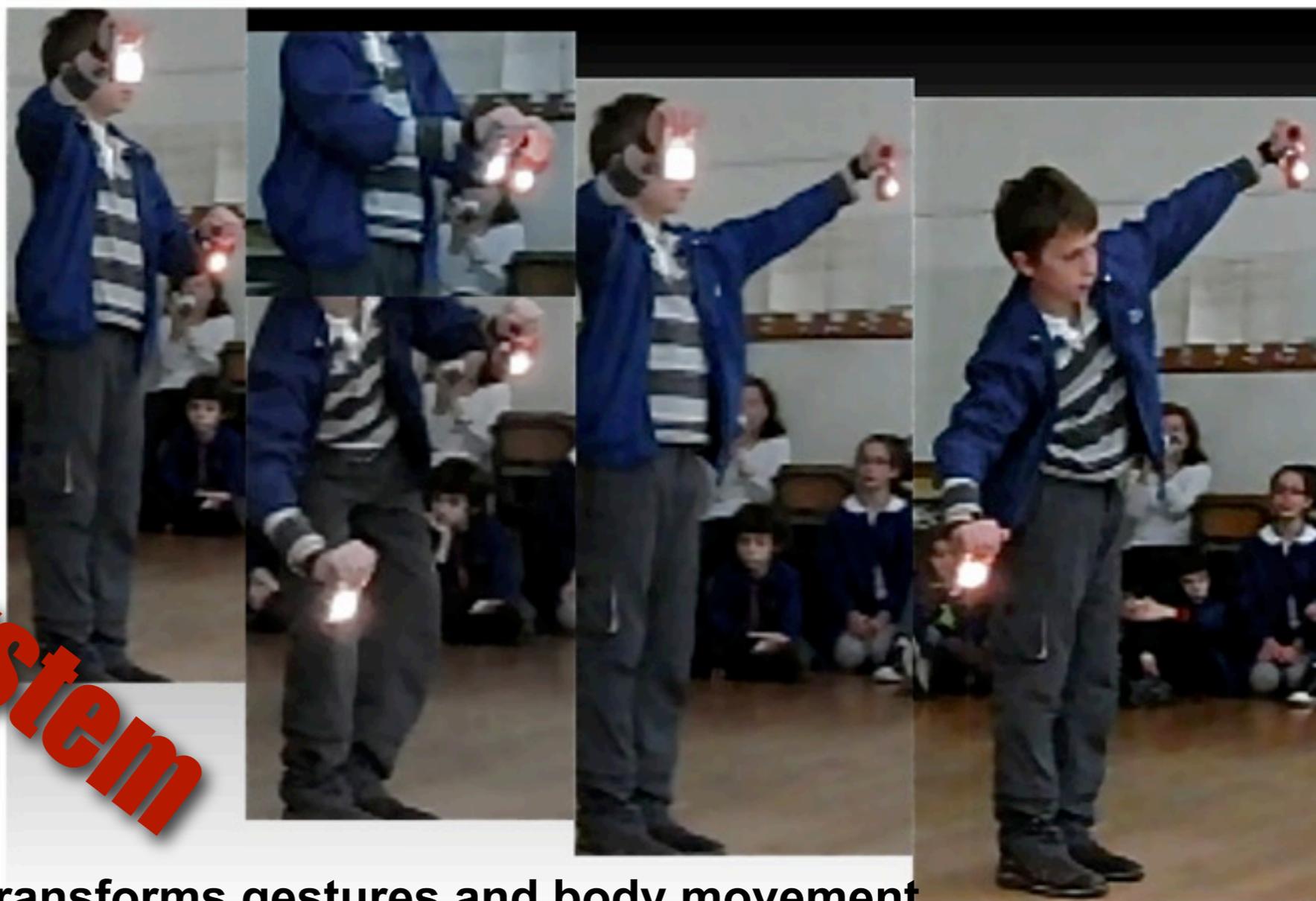
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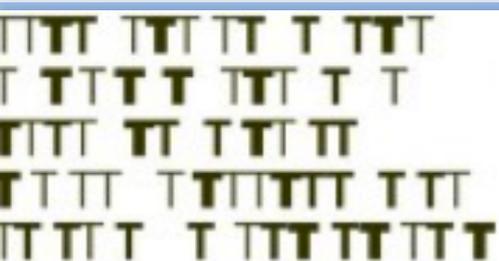


SSGGGc

the system



Transforms gestures and body movement into sound and graphic signs through the reception of input through wii from light sources applied to the body of the performer



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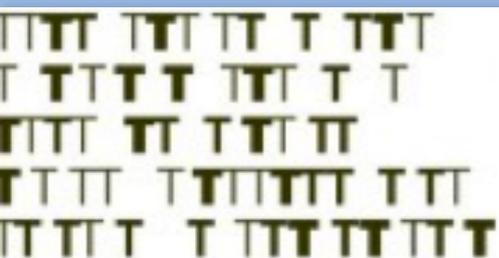
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For the first test we chose

**to set the system without the graphic part
working only on the listening dimension
using pure sound (in order to have the best
and clearest pitch information)**

in the central range of the auditory function

**We used flashlights adapted to be gripped by
the small hands of children**



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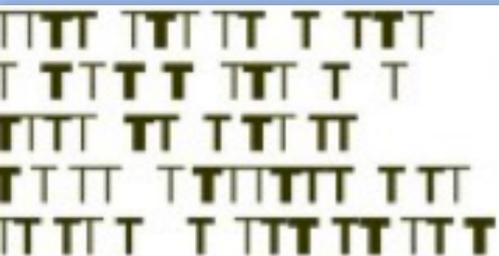
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We proposed the activities asking the students to use the system both with open as well as closed eyes

Strategies and ways

In this way we favoured behaviours controlled only by listening

Pre-test phase strictly checked verbal instructions in order not to influence the children's actions



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Every experiment

one hour for each class/group

10 minutes to set up the working space (an empty space, at least 4 x 2.5 m.) to position the wii cameras and the children, adapting the settings for the different activities

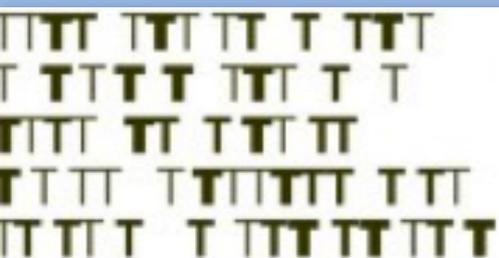
A quiet enough space with not too much light

The system proved to be flexible enough to solve most difficulties we found.



The setting

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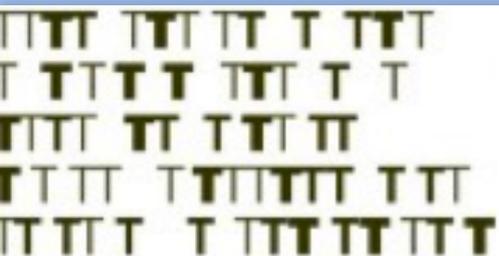


Working in a group (max 10')

practicing collective instructions in order to prepare the children to immediately use EGGS, producing sounds according to strict instructions



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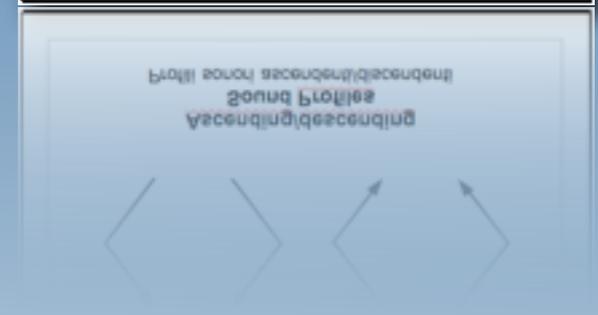
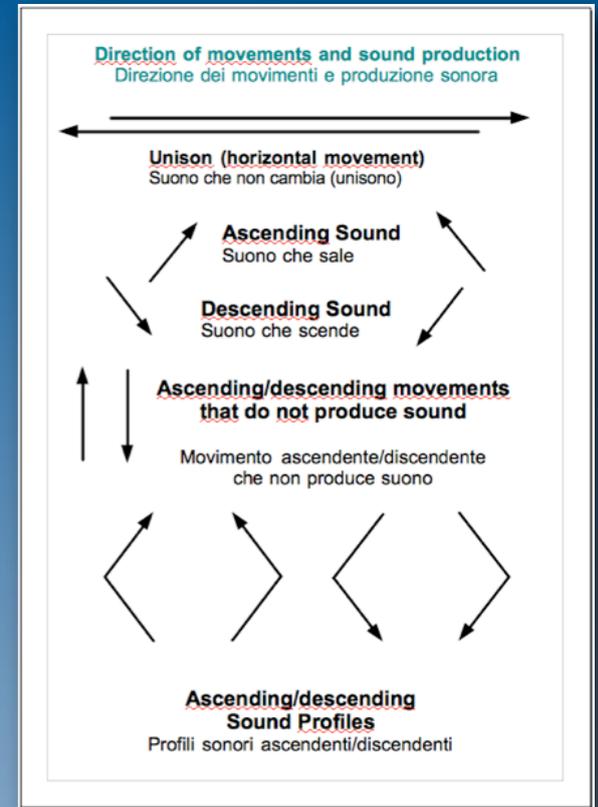
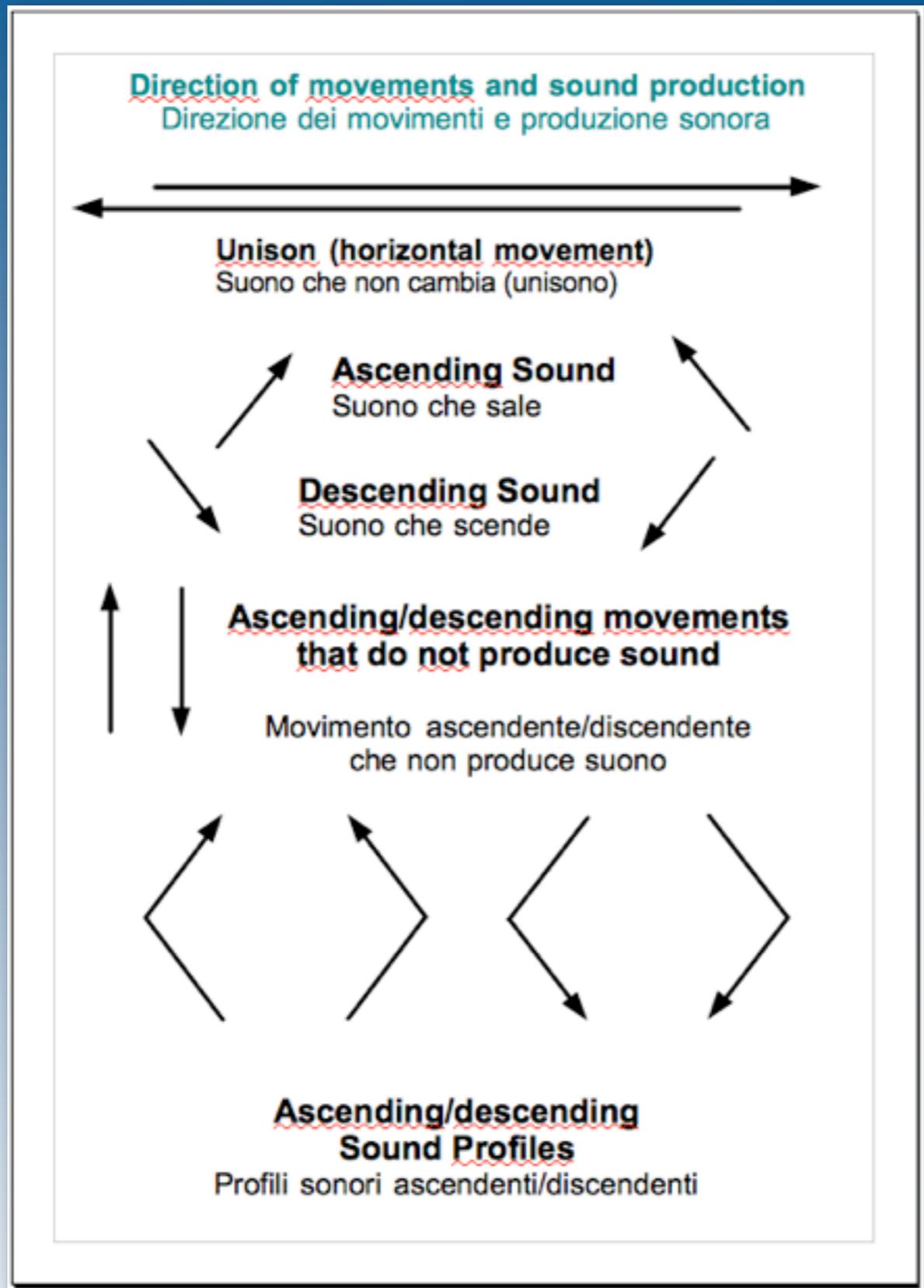


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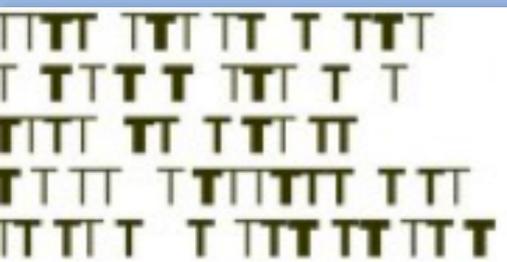
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The action



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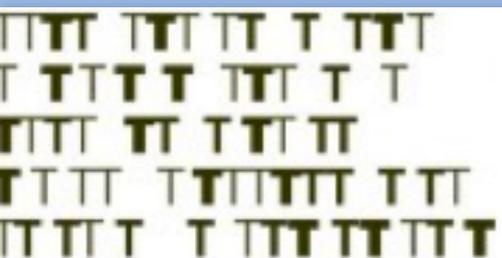
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Working individually/in pairs (max 5')

Students participated

imitating actions of the researcher / carrying out her verbal instructions / following her requests

working with one and two lights, moving one or two hands sequentially or simultaneously



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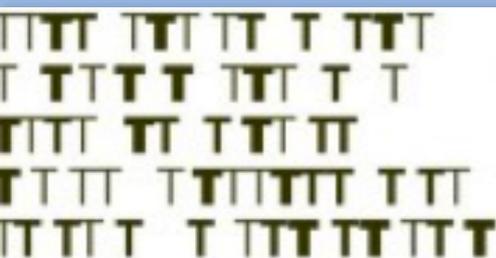
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List of activities and performances

| | ACTIVITIES | NUMBER OF PERFORMANCES | | | Distribution of performances | | Distribution of visual / non-visual mode | |
|----|----------------------------------|------------------------|-------------|-----------------|------------------------------|-------------|--|--|
| | | TOTAL | VISUAL MODE | NON VISUAL MODE | TOTAL | VISUAL MODE | NON VISUAL MODE | |
| 1 | SOUND IMITATION | 559 | 185 | 374 | 27,28% | 33% | 67% | |
| 2 | PROFILE IMITATION | 434 | 202 | 232 | 21,18% | 47% | 53% | |
| 3 | TWO PROFILES IMITATION | 130 | 72 | 58 | 6,34% | 55% | 45% | |
| 4 | PROFILE IN TWO | 516 | 282 | 234 | 25,18% | 55% | 45% | |
| 5 | UNISON IN TWO | 120 | 74 | 46 | 5,86% | 62% | 38% | |
| 6 | PROFILE FOR TWO | 79 | 53 | 26 | 3,86% | 67% | 33% | |
| 7 | TWO PROFILES FOR TWO | 10 | 8 | 2 | 0,49% | 80% | 20% | |
| 8 | UNISON FOR TWO | 16 | 10 | 6 | 0,78% | 63% | 38% | |
| 9 | SOUND IMITATION (2 HANDS) | 26 | 21 | 5 | 1,27% | 81% | 19% | |
| 10 | PROFILE IMITATION (2 HANDS) | 28 | 22 | 6 | 1,37% | 79% | 21% | |
| 11 | TWO PROFILES IMITATION (2 HANDS) | 21 | 17 | 4 | 1,02% | 81% | 19% | |
| 12 | UNISON PARALLELISM (2 HANDS) | 25 | 20 | 5 | 1,22% | 80% | 20% | |
| 13 | PROFILE PARALLELISM (2 HANDS) | 22 | 18 | 4 | 1,07% | 82% | 18% | |
| 14 | TWO SOUNDS PARALLELISM (2 HANDS) | 8 | 8 | 0 | 0,39% | 100% | 0% | |
| 15 | TWO MIRROR PROFILES (2 HANDS) | 14 | 12 | 2 | 0,68% | 86% | 14% | |
| 16 | PROFILE AND SOUND (2 HANDS) | 11 | 9 | 2 | 0,54% | 82% | 18% | |
| 17 | "JOKING CAMERAS" | 30 | 30 | 0 | 1,46% | 100% | 0% | |
| | TOTAL | 2049 | 1043 | 1006 | 100,00% | 51% | 49% | |



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To test the efficiency, flexibility, ease of use, accessibility and self-correction of the system

Aspects of the children's performances as indicators:

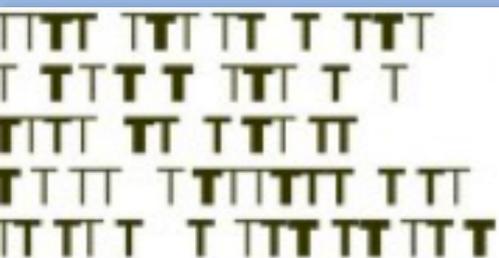
Producing the sound at the pitch required

Producing the sound profile, in the same range, time development and direction.

Coordinating their own action in time and space with that of the partner (producing sounds/sound profiles)

Coordinating and reproducing sounds/sound profiles simultaneously with the partner

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Evaluation criteria and levels

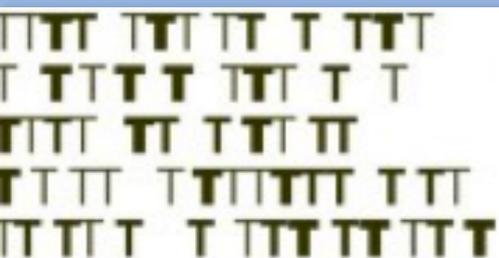
The evaluation was expressed in three levels:
positive, intermediate, negative

Positive evaluation was given to performances that responded appropriately to all aspects observed

Intermediate evaluation was given to performances that partially responded to what was asked

Negative evaluation was given when the requests were not followed

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The researcher did not express any evaluation to the child, but thanked everyone for their participation

Sometimes the children themselves commented on the performances spontaneously, underlining successes or failures

1. Sound imitation. **Positive**: the student reproduces the same sound; **intermediate**: the student reproduces in the approximate range (within an interval of third major higher/lower); **negative**: the student goes beyond this limit.

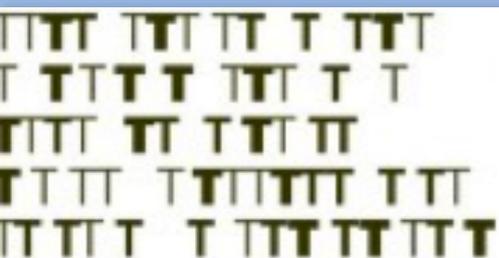
2. Profile Imitation and 3. Two Profiles imitation. The parameters observed are: a) the student reproduces the profile direction (correctly/partially/inverts direction); b) the student places the profile/profiles in the range (correctly/ partially/does not place); c) the student reproduces the length (correctly/ accelerates/slows a little; changes significantly the speed).

4. Profile for two. a) the student maintains the continuity of the profile (exchange coordinated/ imprecise/interrupted); b) the student maintains the speed of the profile (correctly/ accelerates/slows a little; changes significantly the speed).

5. Unison in two. The student holds the pitch (yes/no), coordinates beginning and end (exchange coordinated/ imprecise/interrupted).

For all other activities (6-17). Yes / partially / no.

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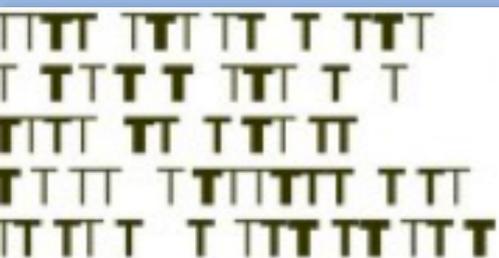
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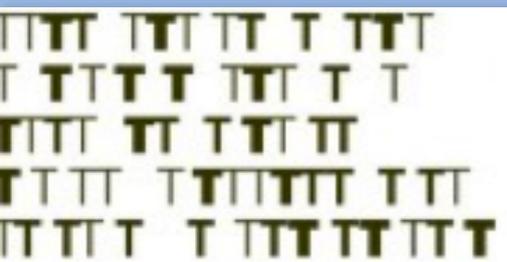
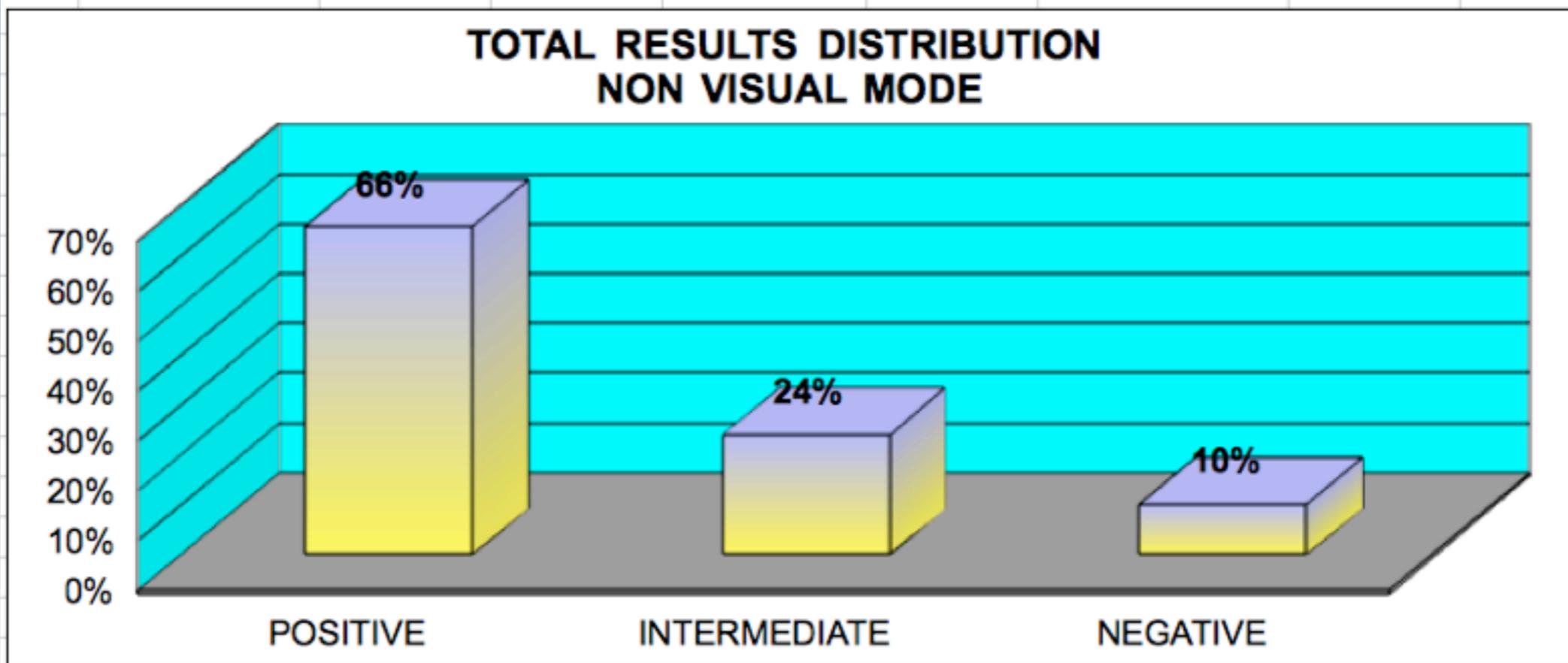
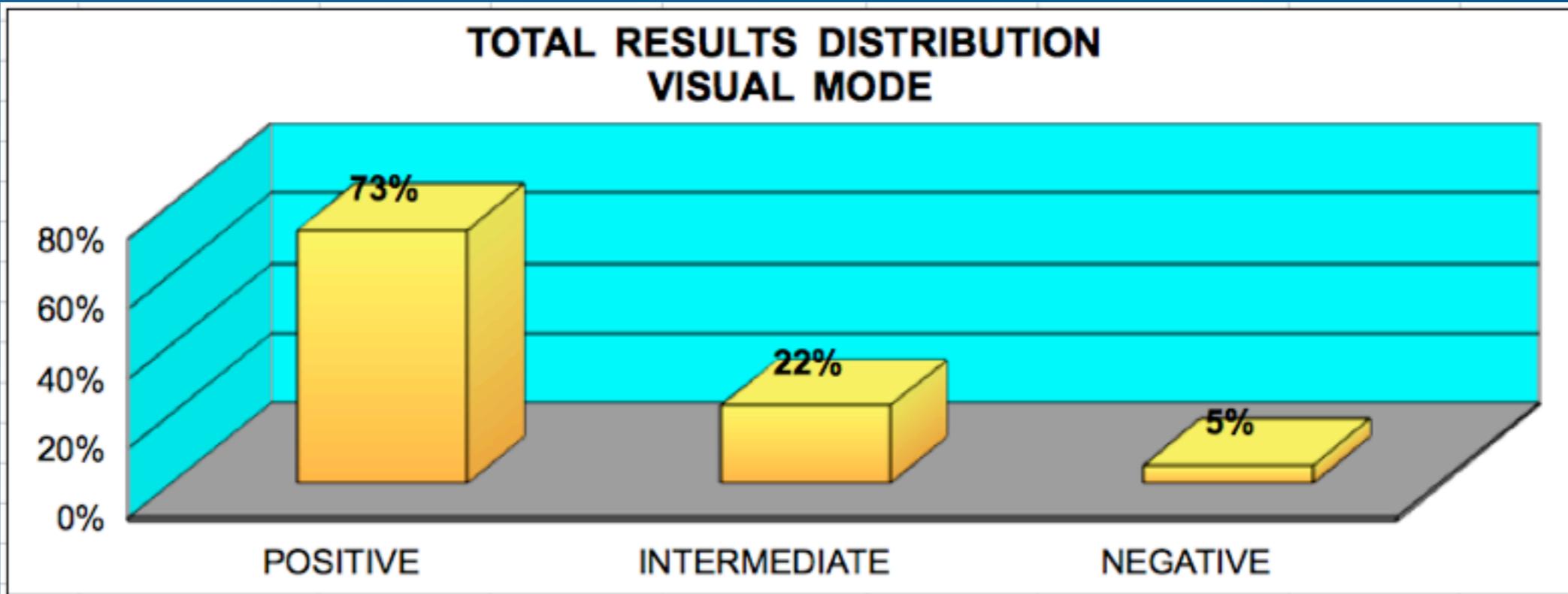
Both in visual-mode as well as in non visual-mode, EGGS was easy to use for children in every class. The quantity of successes in the different performances was very high and encouraged us to consider the system efficient and simple. No children showed difficulties, for example, in understanding immediately how to use it.



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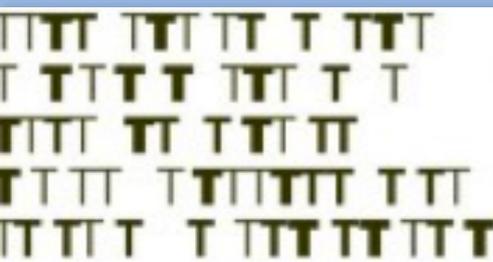
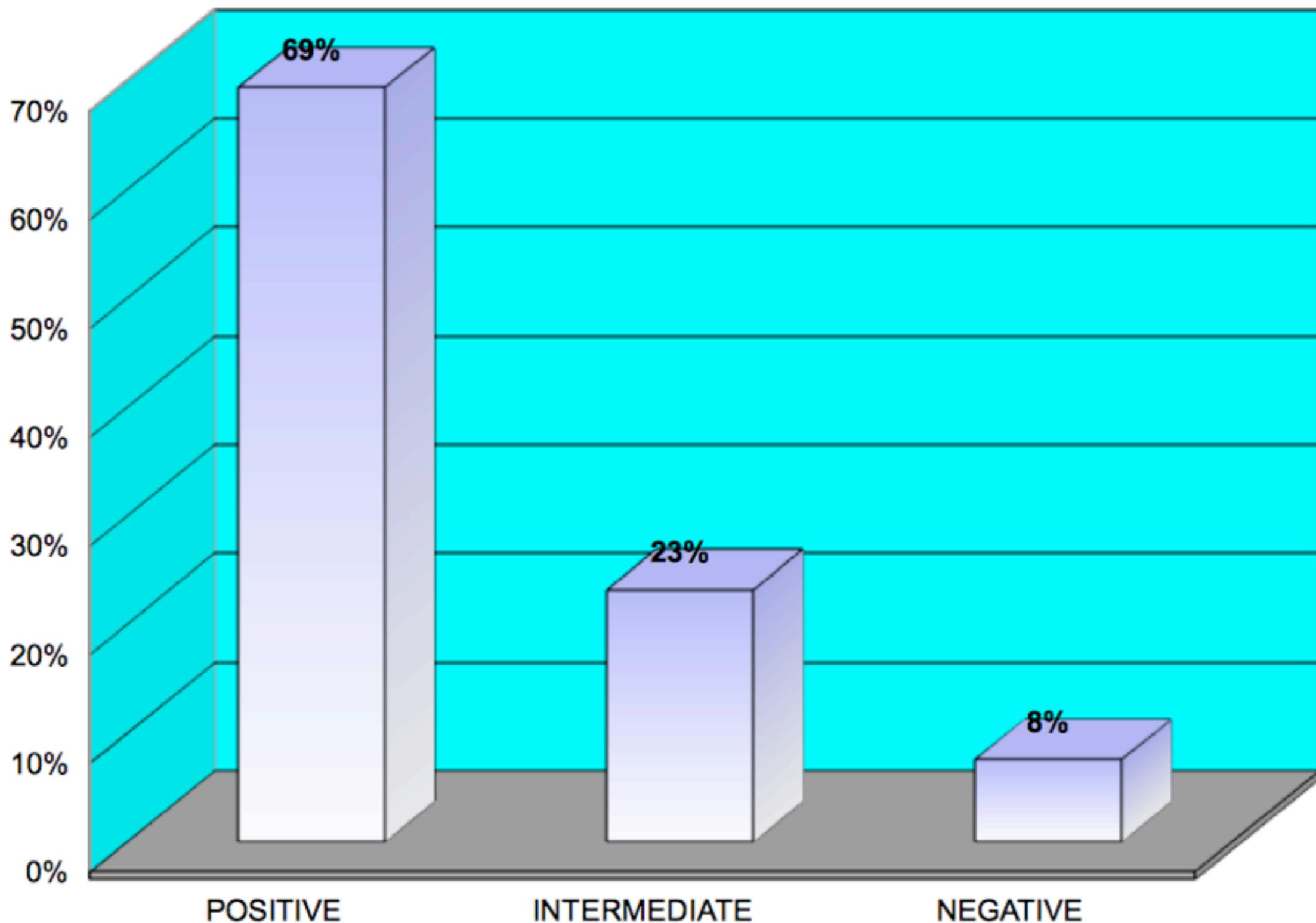
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SSGGG

TOTAL ACTIVITIES: SYNTHESIS OF RESULTS



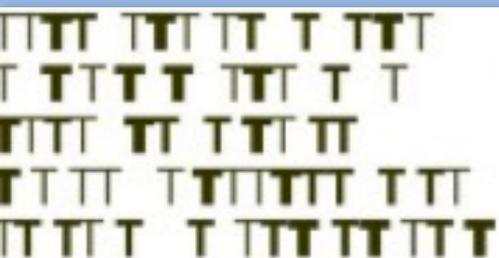
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EGGS and users

E Working on sound pitch-changing perception and production (changing in discrete way, or in continuous mode), the system produced results concerning both sets of users: students and teachers/educators. **G** EGGS is useful for consciously working with pitch representation and first music simple structures. **G** The system gives immediate feedback needed to consciously manage the listening and playing performance. **S** One or more people can use it at the same time, playing in many different ways.



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EGGS



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... we collected free, spontaneous, useful observations

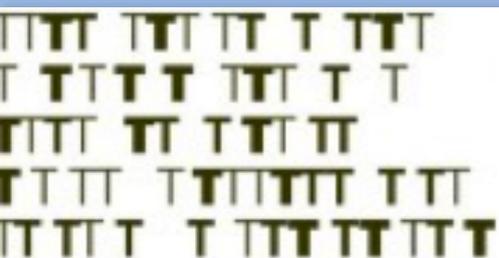
Some of these concerned using pure tones, ... sometimes strange for the users, but only at the beginning of the experience

Otherwise, the pitch information was very clear for everybody.

This interesting aspect, that we did not investigate in this first research project, concerns the emotional reaction/response of the students to this strange sound

We could only assume that it became less strange with a rapid process of habituation

... another interesting consideration regards the performance level of students who generally show learning or behavioural difficulties: often they showed high-level and unexpected performances using EGGS, as well as the other students, or even better



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EGGS



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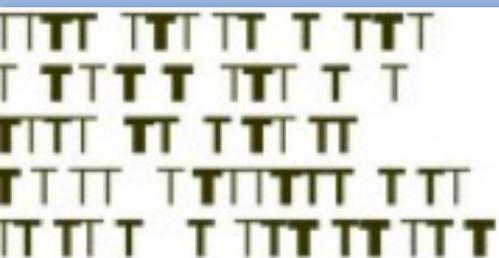
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... is a flexible resource: users (teachers/educators) can easily change sound characteristics and organisation through the relationship between gesture and sound production easily following the different possible settings we tested the system based on the setting's needs (characteristics of the working space and necessary tools) referring to the user interface characteristics, accessibility and clearness even for non experts, configured in an essential way



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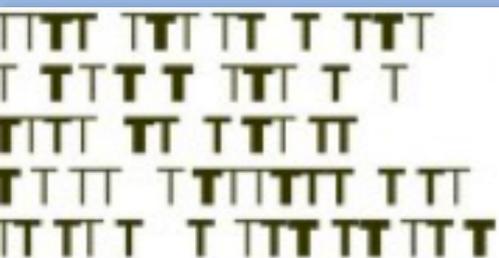
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Activities like imitating, coordinating, completing actions, both with the support of vision and without, were easy for the majority of the children.

Another interesting consideration regards the necessity to improve the protocol of instruction in order to have a simple, clear (clean!) essential way manage the teaching activities in the classroom. Eggs works efficiently if users need or are using very few words. This is an important result that highlighted the consideration that teaching music, especially in practice form, from the most elementary one, needs less words than we generally think, in order not to disturb processes of learning, perceiving, memorizing, concentrating that make music thinking and acting possible.

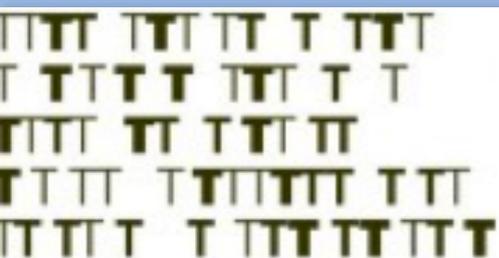


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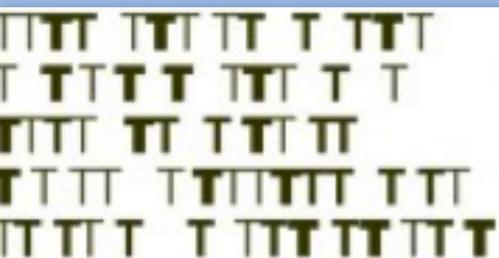


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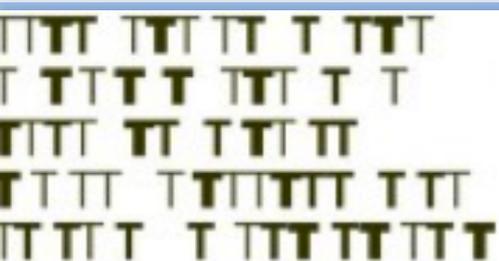


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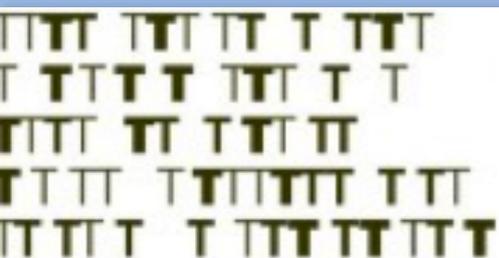
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Thanks for... listening



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