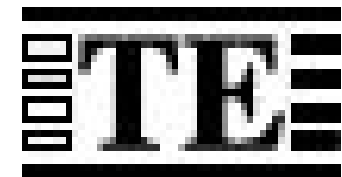# System to support the learning process in people with loss of hearing

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- The reading impairment of the majority of prelingually, profoundly deaf subjects results mainly from a deficiency of their primary linguistic competence.

- It is widely recognized that orally educated deaf children attain only limited ability in the reception and production of both oral and written language.

- The lack of adequate communication between the child and his environment, especially in early childhood, is often identified as the main cause of this situation.

Cued speech is a sound-based system which was specially developed to solve the big problem of poor reading comprehension of deaf people.

If all the essential sounds of our spoken language look clearly different from each other on the mouth of the speaker, even a completely deaf baby or child can learn language in much the same way as a hearing child but through vision rather than listening.

In spite of these advantages, the widespread use of the cued speech is restricted by the small number of individuals who are trained to produce the cues.

The main goal of this project is to develop a system that can automatically produce cued speech from text in real time using a virtual avatar. Besides, it will be study the feasibility of the inverse approach, that is, a system which "understands" the cued speech and makes the traslation from cued speech to text.
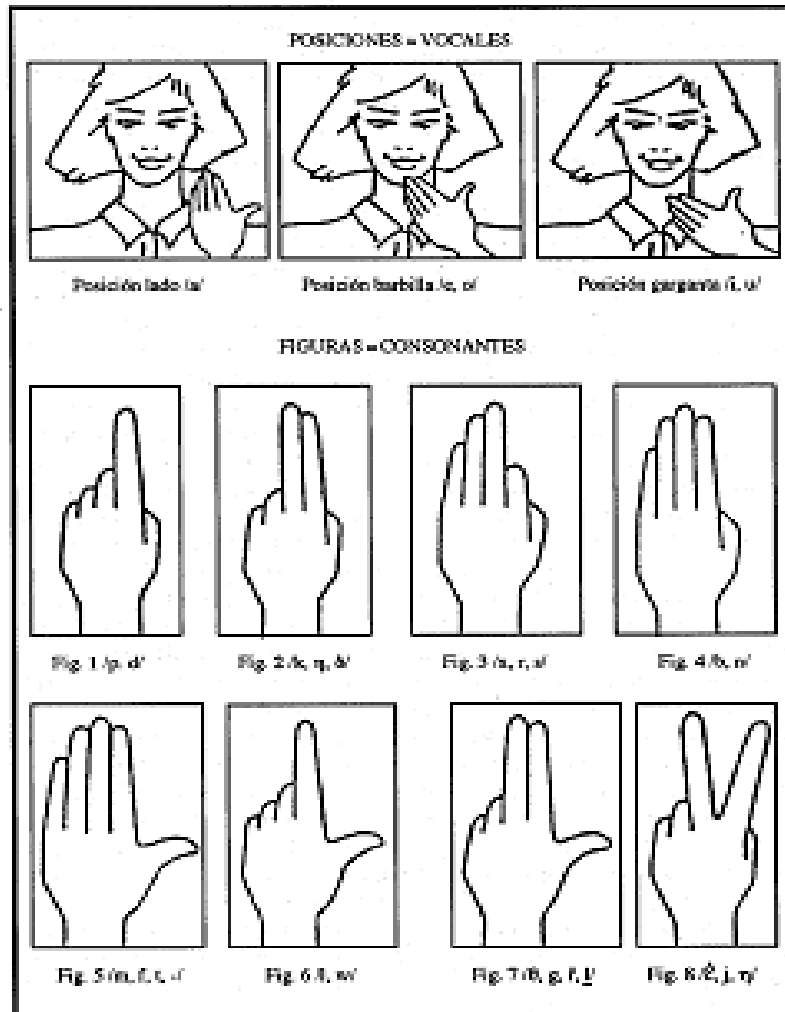
Cued Speech is a simple sound-based system which in spanish uses eight hand-shapes in three positions near the mouth and four movements of the hand together with the lip-patterns of normal speech to make all the sounds of spoken language fully comprehensible to deaf babies, children and adults.

The key idea is to use the hand-shapes, positions and movements to differentiate ambiguous lip positions.

POSICIONES = VOCALES

Posición lado /a/   Posición barbilla /e, o/   Posición garganta /i, u/

FIGURAS = CONSONANTES

Fig. 1 /p, d/   Fig. 2 /k, q, b/   Fig. 3 /s, r, z/   Fig. 4 /k, n/

Fig. 5 /m, f, t, s/   Fig. 6 /l, w/   Fig. 7 /ll, g, r, l/   Fig. 8 /ch, j, ñ/

Three hand positions to distinguish among set of vowels:
- side   /a/
- chin   /e,o/
- throat   /i,u/

Eight hand-shapes to distinguish among set of consonants.

Four hand movements:
- forward *consonant + vowel sequence*
- forward-backward *repetition of a syllable*
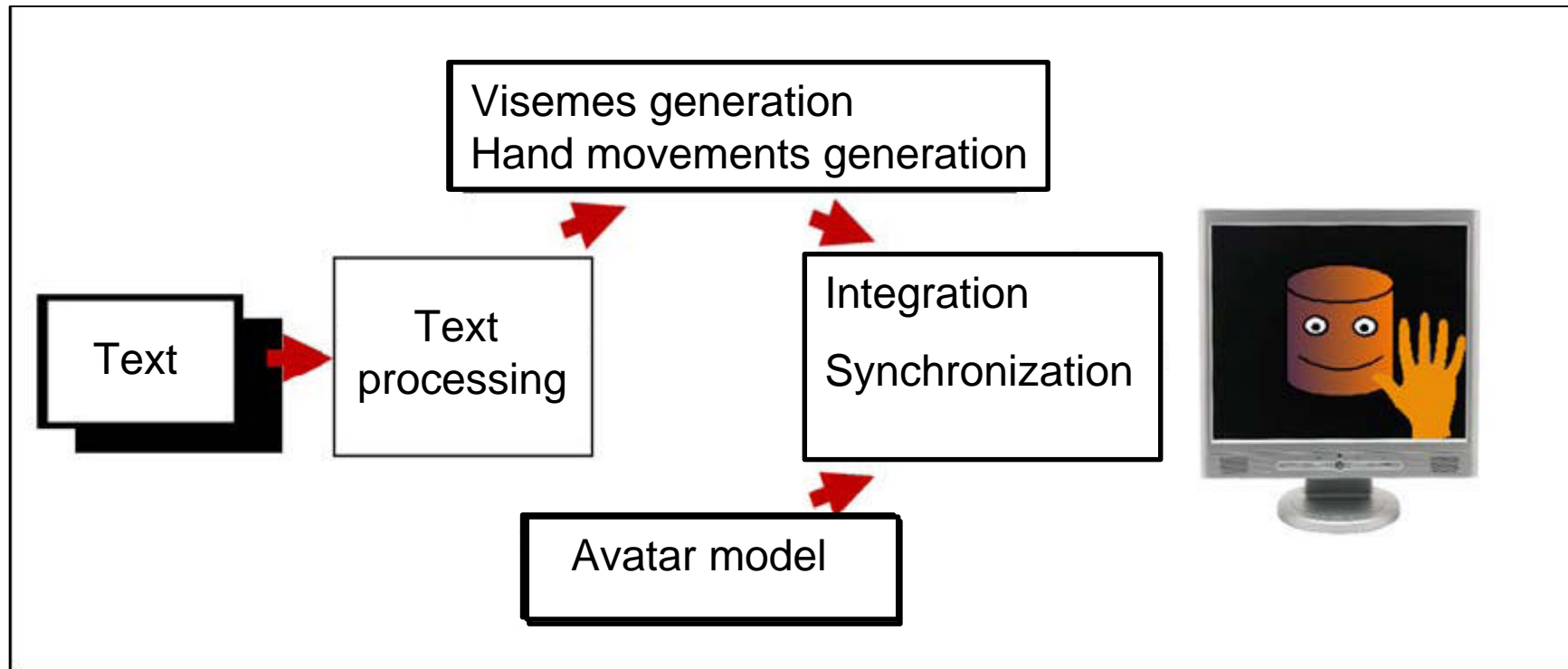- flick *isolated consonant*
- rotation *intonation*

Evaluation of different comercial programs and SDK's for the development of talking heads:

- visage|SDK of Visage Technologies.
- SDK of inovani.

Problems:

- The talking head must to speak in spanish (using spanish visemes) with accurate lip movements: most of the found software is developed for other languages.
- It must be integrated with a moving hand: the software must be capable of integrate and synchronize the talking head with the hand.

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