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Is language genetically coded?

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Electronic scanners confirm the hypothesis: language is based on a hereditary capability, is genetically coded.

In 1981 the subject was still taboo for *De Morgen*. Now, 32 years later, the Belgian daily pays the considerable attention that it deserves. (1) Title: “Premature babies recognize syllables.”

Debusschere: “First evidence for sophisticated speech before birth. ... It is one of the big questions in linguistics: are we born with a refined feeling for language or do we build our talent from birth? “According to Fabrice Wallois, leading a team neuroscientists at the University of Picardy, unborn babies as early as the sixth month distinguish syllables. Electronic scanners show that the linguistic connections in the cortex are present and functioning before birth. These structures do not need to built up by repeated exposure to voices as is commonly stated. The changes in oxygen supply that is observed to certain parts of the cerebral cortex, give an answer to the question if whether linguistic feeling or either education make the recognition of syllables possible. Wallois concludes from the observations that at least part of the speech recognition capabilities are innate.

Developmental psychologist Janet Werker, University of British Columbia, concludes from the observations: “This is the first evidence that already before birth the brain is able to distinguish difficult consonants from each other.” (2)

The scientific journal PNAS (2) titles: “Unsupervised learning of vowel categories from infant directed speech.” “Infants rapidly learn the sound categories of their native language, even though they do not receive explicit or focused training.” G. Vallabha: the success of the OME algorithm “has several implications for theories of vowel acquisition.” (2)

Consequences for genetic semantics?

According to genetic semantics all languages and sign systems arise from genetic coding. (3, p.10) Syllables should be considered as vowels, supported by consonants. The vowels are the “letters” of the genetic alphabet. A well-known scheme from Prof. L.P.H. Eyckman (4) shows a graphical representation of our encoding. (fig.1A) The 4 ‘main vowels’ *a*, *e*, *i* and *o* represent, according to genetic semantics, the four letters of the DNA strand: the nucleotide bases thymine, cytosine, adenine and guanine. (3, p.37) (fig.1B)

	0	1
0	a	e
1	o	i

fig.1A

	0	1
0	T	C
1	G	A

fig.1B

Researchers from the University of British Columbia claim that they have discovered “language-specific vowel categories” both in English and Japanese. The statistics allowed them to draw up an algorithm, the OME, that visualises the “Expertation-Maximization”.

The OME algorithm. (Parametric algorithm for online mixture estimation)

OME is an application of “Gaussian categories” i.e. the recording of classifications on the basis of statistical data. “The vowel position of each production was characterized by three parameters: F1 (First formant), F2 (Second formant) and Duration of the steady-state.” (fig.2) Further down the article the author provides detailed calculations of statistical research. These show that (both in English and in Japanese) 95% of the test results are divided into four categories. (fig.3)

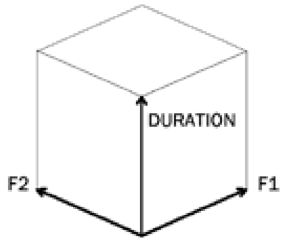

fig.2

“Infants are initially responsive to a wide variety of native and nonnative speech sound contrasts.” English children can e.g. at a very early age distinguish Hindi sounds or use Zulu clicks. Adults lose these abilities.

The authors also confirm the importance of the vowels in the recognition of syllables. “This approach may be potentially appropriate for vowels because they vary more smoothly with changes in articulation than do many consonants, and their acoustics are relatively well understood. ... Infants as young as six months have been shown to be sensitive to the vowel categories, specific to their native language.”

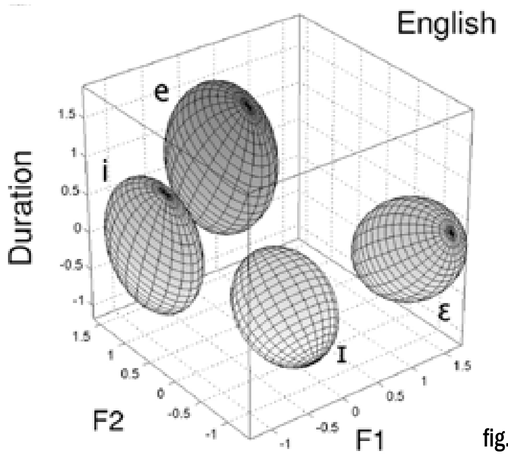

fig.3A

OME and genetic semantics.

Vallabha (2) : “Model (that) explicitly learns a probability distribution for each (vowel) category. ... The algorithm treats the vowel stimuli as coming from a set of Gaussian distributions corresponding to a set of vowel categories.”

The OME model consists of four vowels placed against three coordinates. It can be easily converted into a semantic space. The question is to what depth, height and breadth dimension the parameters F1, F2 and DURATION correspond.

Figure 3a visualises the situation for English, figure 3b for Japanese.(2)

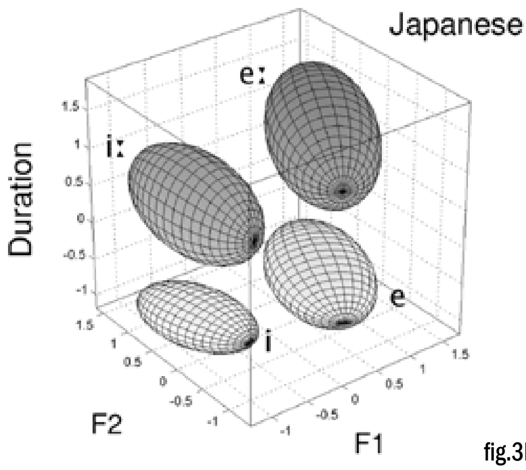

fig.3B

OME leaves no doubt about the direction of semantic opposites. (fig.4) The authors indicate these with three antonyms.

F1	back : front	depth (D)
F2	open : close	height (H)
DUR.	long : short	breadth (B)

The research of J. F. Werker into “vowel pairs” in English and Japanese results in the following classifications: (phonetic script, “i” as in tick, “i:” as in meat, “e” as in when, “e:” as in mail).

English:	i/I	against	E/e	open : close	Depth (D)
Japanese:	i/i:	against	e/e:	short : long	Breadth (B)

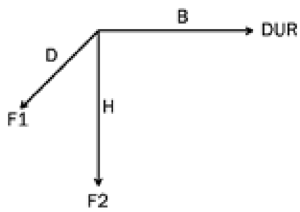

fig.4

Genetic decoding:

D back (0) : front (1) or in Chinese notation (5): back (- -) : front (---)

H open (0) : close (1) or in Chinese notation (5): open (- -) : close (---)

Is the diagram of Eyckman compatible with the OMLE model? Werker puts pronunciations of identical vowels against each other. Eg. the short *a* against the long *a:*. Eyckman on the other hand places vowels in opposition: *a* against *i* and *o* against *e*. (fig.1A)

The method which we use in classifying colours can also be applied for the classification of vowels. (fig.5) On the vertices of the large cube come 8 vowels. Around each of these corner points are 8 variants on a vowel.

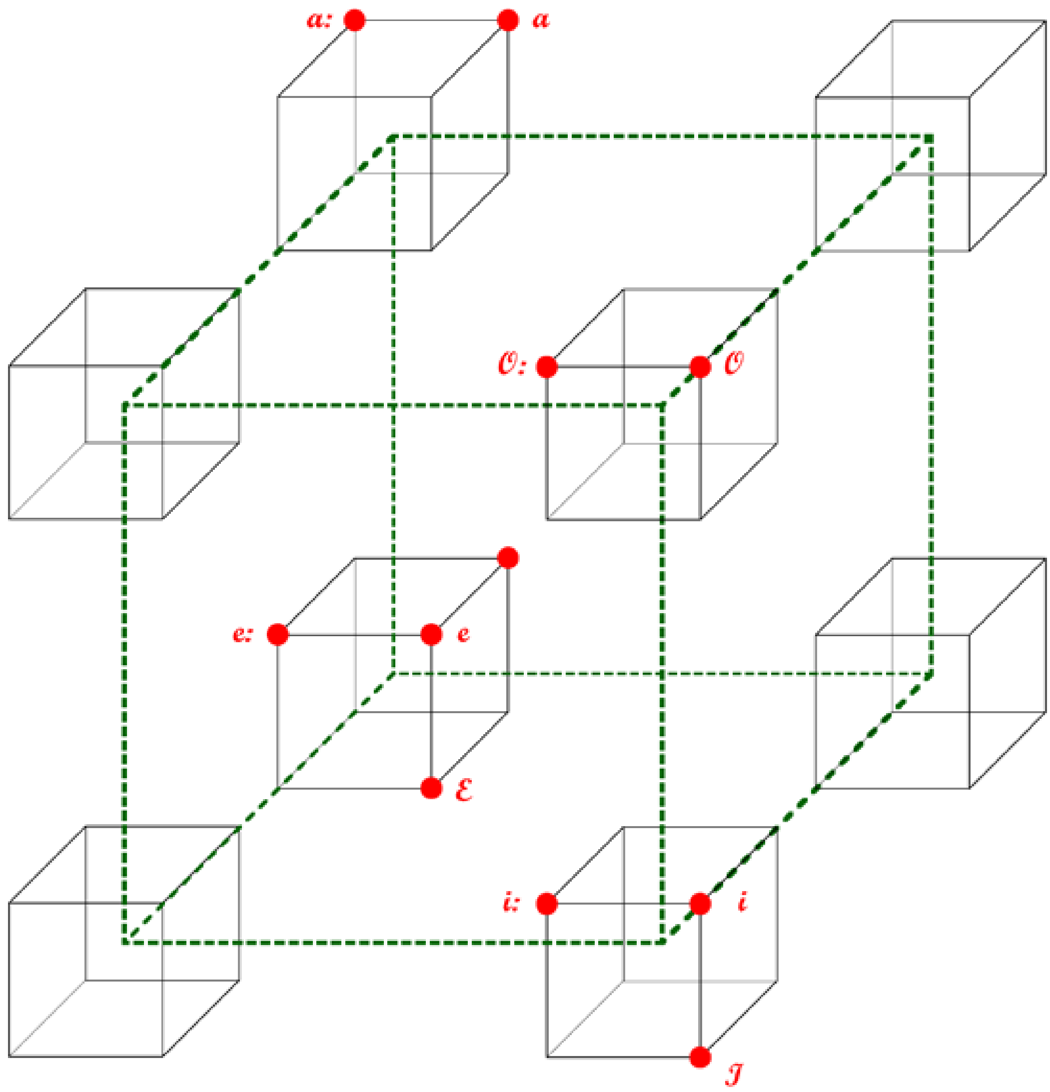

fig.5

When we look from the rear of the big cube (fig.6), the 4 vowels are located in one plane, in the order -> a -> e -> i -> o -> as in the diagram of Eyckman .

In colour code: -> blue (BL) -> green (GR) -> yellow (YL) -> red (RD) -> (fig.10)

Codically: -> 000 -> 010 -> 111 -> 101 -> (fig.11)

Or in the Chinese notation (5) the four symmetrical trigrams, combinations of broken (- -) and whole (—) lines.

Contradiction?

Of the eight vertices of the cube one is in all respects 'yin' (- -): the corner point behind, above, right. From an external perspective, the D.H.B.-order on this corner is clockwise.

Figure 7. The D.H.B.-order is clockwise for 4 vertices of the cube.

Figure 8. The antonyms prove that F1.F2.DUR. = D.H.B.

Figure 9 corresponds with the OMLE model (fig.2&3) and starts from the corner point situated in the front, below, left position. This is diametrically opposite the corner point. (fig.8)

F1.F2.DUR. must rotate counterclockwise to achieve a D.H.B. order. However, according to figure 9, at this corner point the rotation should be clockwise for to achieve a D.H.B. order. This contradiction, which concerns only the display, can be corrected by changing one of the three vectors or all three vectors in the OMLE model, so that F1.F2.DUR. = D.H.B. is preserved.

Sources

1. Debusschere Barbara (2013) *Premature baby herkent lettergrepen,* De Morgen 27.2.2013

2. G. K. Vallabha, J. L. McClelland, F. Pons, J. F. Werker, and S. Amano, (2007) *Unsupervised learning of vowel categories from infant-directed speech*, Proc. Nat. Acad. Sci., vol. 104, no. 33, pp. 13 273–13 278.

3. Alpaerts F. (1981) *De Denk-beeldige Ruimte,* Antwerpen Genetic Coding.

4. De Groot A.W. (1968) *Inleiding tot de Algemene Taalwetenschap*, Groningen Wolters-Noordhoff N.V.

5. Wilhelm R. & Baines C.F. (1977) *The I Ching, Book of Changes,* Princeton University Press.

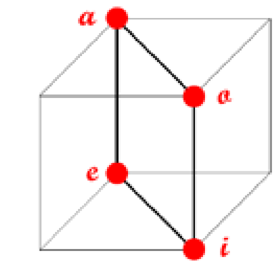

fig.6

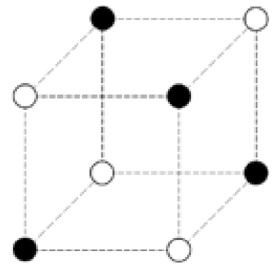

fig.7

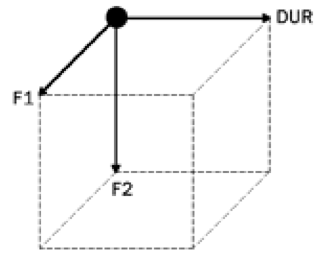

fig.8

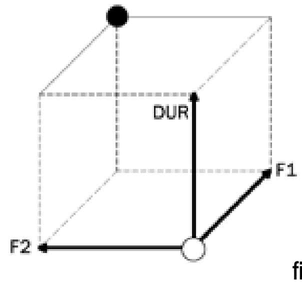

fig.9

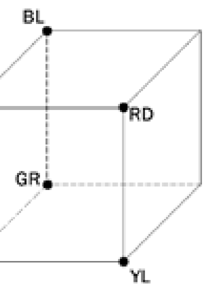

fig.10

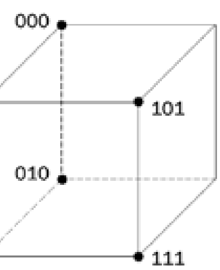

fig.11