

CMAP AND CMAPTOOLS FOR LINKING THE FUTURE

Liviana Giombini, University of Urbino, Italy
livianagiombini@tiscali.it

Abstract. One of the most important steps of the cognitive process of the human mind, after the word, is the moment of discovery of writing. From the very beginning of the appearance of verbal speech, oral and written, what strikes us is the *creative aspect of linguistic use*. The examples, show that is pure creativity with its features of extension and movement, the first *system principle of linguistic competence* on which infants organize the *first rules of their verbal speech*.

1 Introduction

The greatest discovery in life in every human being is discovering that any single thing has a name. This is a crucial time, and from this point *on the language becomes intellective and the thought becomes verbal* (Vygotskij 1962, p. 112). Also in Luria (1957, 6), "*it's undoubtedly the role of the word in order to brighten up the complex of signals and to create the perception of the object*". In the feedback name-object, the genetic point has to be traced in the intersection of thought and speech (Vygotskij 1962), the process that in Stern (1922 by Vygotskij 1962 p. 111) "*can be considered a reason of an actual, maybe the first – general thought in a child*"

These positions now find surprising confirmation in a study just published by researchers at the University of Pennsylvania (Bergelson E., Swingley D., 2012) "*It is widely accepted that infants begin learning their native language not by learning words, but by discovering features of the speech signal: consonants, vowels, and combinations of these sounds. Learning to understand words, as opposed to just perceiving their sounds, is said to come later, between 9 and 15 mo of age, when infants develop a capacity for interpreting others' goals and intentions. Here, we demonstrate that this consensus about the developmental sequence of human language learning is flawed: in fact, infants already know the meanings of several common words from the age of 6 mo onward*".

Thanks to investigative techniques allowed by new technologies, the study of Bergelson and Swingley shows that the child begins to acquire language through the cognitive discovery of word / meaning units from the first months of life, and this testifies Chomsky's theory about the genetic and generative structures.- of the system of linguistic competence (Chomsky 1988, 2006).

If the linguistic competence of the brain organ provides the discriminatory parameters through which a child immediately learns that words are units of meaning and that the sentence is composed of a variable number of such units (Chomsky 1988), nevertheless the articulation of words, initially sound and later graphic, syntactic and paradigmatic, is the fruit of a technique which must be constantly exercised; it happens through trials and errors and only through continuous interaction between the child who learns to speak / write and those are around him

2 Language and thought: a matter of words

The acquisition of language can provide a paradigm for the entire problem of the relationship between learning and development In fact, if **an infant at six months, when his vocabulary is only a cacophony of sounds and syllables constantly changing**, (comparable to a sound produced by an orchestra in testing "instrumental arrangements" before the performance), already understands the meaning of many words, we assume that:

1. verbal language is the main occasion for communicative interaction. In particular, the word "*first act as the means of concept formation, then they become their symbol*" (Vygotskij 1962, p. 133);
2. the apparatus for comprehension the meaning of linguistic signs comes into operation "automatically" and precedes the verbal-expressive skills, which appear later due to the difficulty of learning the use of "instruments";
3. the evolutionary process of linguistic competence and quantitative learning process follows the "instrumental" (the first intelligible words follow, with amazing speed, acquired all the words in your environment);

4. the correlation between deep structure (meaning) and surface of the sentence (material aspect) “*result of certain mental operations, in modern terminology, through grammatical transformations*” (Chomsky 2006, p. 41), comes into operation from the earliest moments;
5. in favoring the “*underneath biological matrix that provides a situation in which the language improvement develops*”- “*a system of principles, conditions, rules, that are [...] the essence of human language*” (Chomsky 1988), the child realizes the abstraction of determined peculiarities, their synthesis, their symbolization throughout a sign;
6. difficulties in learning to write from use of inappropriate methods. In fact, even today, many are in use teaching practices related to traditional methods that depart from postulate (incorrectly) that the child's language development begins with the discovery of the characteristics of the speech signal (consonants, syllables) and the combination of these sounds to get then the word (alphabetic methods, syllabic methods...);
7. in analogy with verbal language for writing, movement passes from the outside (the units of meaning of words) inside (the decomposition of the mix of sounds that is the word in audio-visual signals: consonants, vowels, graphemes). The discovery of alphabetic writing begins when the child learns that you can track not only things but also their names, as rightly described by Vygotskij;
8. the successful training of concept maps, (a true writing system based on the word / units of meaning (concept)) is assumed in his analogy with the evolutionary process of the system of verbal language-species-specific-detected by Swingley and Bergelson ..

3 Learning to learn: the creative aspect of language use

One of the most important steps of the cognitive process of the human mind, after the word, is the **moment of discovery 'of writing'**, that magical moment when a child, for the first time in his life, using different symbolic systems in a coordinated way: verbal-symbolic - visual and communicates through forms and colors.

Hypermedia and hypertext writing is the ultimate and most complex model assumed by human writing, and computers are the support that actualizes the interactivity between various semiotic systems (verbal- symbolic-visual). In this perspective it becomes necessary to reformulate the literacy of children on a complex semiotic register (multi-literate) and not limited to the verbal system (neglecting the symbolic and visual).

So I think important to consider some questions:

- From the very first manifestations, the development of writing competence seems following a similar progress to the verbal one, and when he's two years old what can appear as a scribble is instead a meaning representation (another instrumental test, before the symphony execution!).
- The expert use of meta languages, source of cognitive advantages, is the result of a series of preparatory and continuing discoveries that allow the mind to organize a *generative grammar*, or to appropriate *the necessary structural elements that allow the infinite use of finite means* (Chomsky).
- From the very beginning of the appearance of verbal speech, oral and written, what strikes us is the *creative aspect of linguistic use*.
- In all examples, we find that linguistic competence is ruled by a principle with “*a creative aspect*”, which in Chomsky's (2006, p. 33)- we highlight in the most clear way ‘*in what we can call 'the creative act of linguistic use', along with its essential properties of extension and movement*”.
- Computer is the place of connection between mind and new symbolic universes, where *the creative aspect of linguistic use* can find its maximum expression, provided that to the learning mind are given opportunities of grammatically correct writing. In this sense CmapTools represents an excellent scaffolding of support.

4 CmapsTools. A “generative software, grammatically correct”

In other communications (Giombini 2008) we have shown that it is possible to obtain the continuity of educational courses designed to develop the complex skills of writing (hypertext and hypermedia), since the early days of elementary school with maps conceptual and CmapTools. In our experience, CmapTools, unlike other platforms, provides a further advantage of basic language use. Nodes, lines, arrows, attachments are not just a visual way of organizing discourse, but becomes an exercise in discernment and correct use of language structure and grammatically correct (generative grammar)-The conceptual expansion and linking words spell out the relationship between surface structure and deep structure of the sentence. As described by Chomsky, in fact, “*the surface structure of a sentence is often misleading*” (2006, p. 68), a source of misconceptions. The connection of the concepts articulated linguistically explicit relationships and allows you to correct any errors.

Furthermore, the ability to highlight (or hide) parts of the maps goes beyond the practical utility of summary (containment) of the maps themselves. These features are the structural elements that allow the mind to organize a *generative grammar (infinite use of finite means)* In fact, these features allow students to develop complex language skills (critical and creative thought) and to organize more and more experts in hypertext writing grammatically correct. To all my students computer has been the support of writing, the habitat of the mind that learns to build itself - and the concept maps and CmapTools the instruments to learn to "link" to the future

5 Documents

The following images illustrate some steps in the development of symbolic language over the course of preschool and school life (2/3 - 4/5- 10 years)

5.1 The "discovery" of writing

The following images illustrate some moments of transition of the development of symbolic language. They belong to the same girl in a line of time **from 2 to 3 years of age**. They are spontaneous writings made by Clare in some moments of relax at home. The drawing has been done at 2 years (FIG. 1) at 2 years and half (Fig.2) at 3 years (Fig. 3). In the first two illustrations, Clare has drawn herself, in the last her cat.

The instrumental development monitored every six months is amazing (comparable to the appropriation of words). In the Fig.1 and 2, Clare draws herself. The harsh contrast between the accurate representation of spiders and cobwebs (extraordinary for her age of 2 and an half – Clare is born in May and the drawing was done in November, just after Halloween) and the representation of an incomplete human figure shows clearly that the perception of real objects anticipates the perception of the corporeal self (Vygotskij, 1962 p. 170). This is a fact confirmed in the next wonderful representations of her cat (Fig.3).



Figure 1: "Clare" - 2 years



Figure 2: "Halloween" 2 years and half



Figure 3: "The cat" 3 years

But the most astonishing thing that we can see in Figure 1 and Figure 2 (and from that on in all the other drawings where Clare represents herself) is that kind of abbreviation that appears at the end of the page: that set of lines and circles, OIOIO – a real and proper *binary code*- that we learn from Clare was to be her "signature".

5.2 Concept maps as a "matter of creativity, extension and movement"

The following images: are concept maps (Figure 4; Figure 5; Figure 6). The examples 4 and 5 are the first - ever-map conceptual spontaneously written by two girls: in one case four years, another five. The last image (Figure 6) is a hypertext-concept map created by pupils of the fifth class of primary school (10 years). The pictures 4-5 tell the "discovery" of "argumentative writing". Figure n. 6 is an example of the possibilities of writing complex that kids can develop if properly supported.

Maps 4 and 5 show that writing of c-maps is a way "spontaneous". Both concept maps were "written" at home as a game, in relax moments, (out of any organized learning context), by Clare – 3 years and 11 months old (Figure 4) and by Joan – 5 years and 2 months old (Figure 5). Both girls were asked to "write" what they knew about something that they love. The topic chosen by Clare was her cat, the topic of Joan was the sea. Clare (3 years and 11 months), organizes the description --or concept map (4)-- starting from her cat (shape and colours convincing. The cat is fawn). Then a series of conceptual expansions (from the bottom and counter clockwise): the basin with sand, the yellow ball preferred by the cat, claws, the water bowl, moustaches, the

food bowl. We can notice that the moustaches depicted are human, not of a cat, which is a clear example of initial generalizations of linguistic words (and of transition from one stage to the other of development)

We can, once observed: "the inclusion of the word generalizations as quite specific reflection of reality in consciousness" (Vygotskij, p. 332). Joan's map (5) starts from the word sea. Then, suddenly anticlockwise, she developed her narration: she swims in the sea, and she sees a dolphin and other fishes. The sea is salty. What makes this map interesting it's the appearance of a double link that connects the word "sea" to all the concept expansions. When asked what they meant those two lines Joan replied in wonder, "Because write once and once we read".

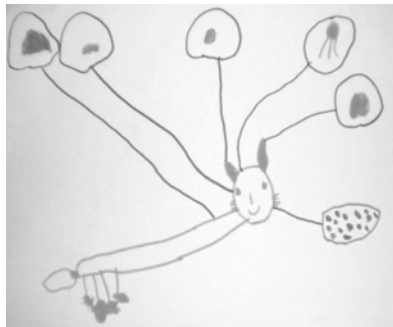


Fig. 4: Cmap "The cat" by Clare 4 years

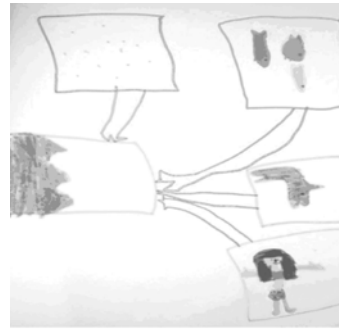


Fig. 5: Cmap "The sea" by Joan 5 years

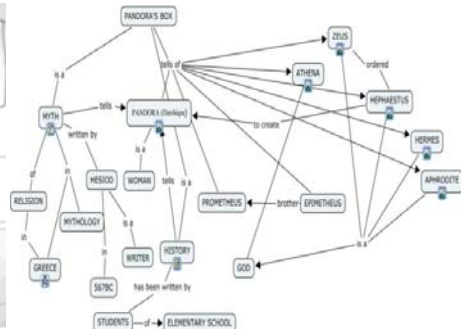


Fig. 6: Hyper map "Pandora's box" 10 years

In all examples, a very important aspect appears: the creative aspect of the linguistic use. They show that is pure creativity with its features **of extension and movement**, the first "system principle of linguistic competence on which infants organize the first rules of their verbal speech".

Map of Clare (Figure 4) is governed by the principle of **extension** (a concept - the cat-expands into a set of concepts). In the map of Joan shows the principle of creativity is in all respects: they are both obvious **extension** (the concept - the sea - creates a complex tale) and **movement** (which is explicit in the bi directional communication: "once you write once read". **Extension and movement** are the "rules" that organize the c-maps; but especially in the writings of hypertext maps that show more clearly what we might call '*the creative act of language use*'.

6 Summary

In verbal language, oral and written, is the principle of creativity that emerges every time with its rules of extension and movement. In this sense, the c-maps represent the write mode closest to the natural system of species-specific linguistic competence. Computer is the place of connection between mind and new symbolic universes, where the creative aspect of linguistic use can find its maximum expression. Provided that the mind should be given opportunity to write "grammatically correct and generative" In this sense CmapTools represents an excellent scaffolding of support.

7 References

- Bergelson E. Swingle D. (2012) At 6–9 months, human infants know the meanings of many common nouns, by Department of Psychology and Institute for Research in Cognitive Science, University of Pennsylvania <http://www.pnas.org/lookup/suppl/doi:10.1073/pnas.1113380109/-/DCSupplemental>
- Chomsky N. (1988) Language and Problems of Knowledge The Managua Lectures. Cambridge, Mass.: The MIT Press
- Chomsky N. (2006) Language and Mind, Third Edition, Cambridge University Press, Cambridge
- Giombini L. (2008) Concept Maps and CmapTools: A cognitive Writing System for the General Development of Thought in Scholar Age, In A. J. Cañas, J. D. Novak, P. Reiska, M.K. Alberg (Eds.). Concept mapping-Connecting Educators, Proceedings of the Third Conference on Concept Mapping, (Vol. 1. Part one, pp. 252-259) Tallinn, Estonia & Helsinki, Finland.
- Luria A.R. (1957) Le role du langage dans la formation des processus psychiques (Mosca-1957- trad. Irene Lézine) . <http://luria.ucsd.edu/Articles-by-Luria/Luria-by-Language.html>.
- Vygotskij L. S (1962), Thought and language, by E. Hanfmann, and G. Vakar, MA, MIT Press, It. Ed.(1964), Pensiero e linguaggio, Firenze, Italy , Giunti.