Commentary on "Segmental analysis and literacy" (Morais et al.)

IS IT NECESSARY TO HAVE A SYNTHETIC POINT OF VIEW TO ANALYSE ANALYTIC COMPETENCE?

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Having expressed in the editorial of this issue of CPC my admiration for the authors, I will begin my comments without any other preamble. What puzzles me in their article is the absence of a general frame of reference, of a synthetic view of cognitive development or at least of speech acquisition. I am particularly sensitive to this lack having tried myself at different occasions to elaborate such a frame work - itself certainly too speculative for the taste of my colleagues. My successive attempts, far from being entirely satisfactory, have nevertheless allowed me to give coherence to the experimental data at my disposal related to cognitive development.

Thus, in spite of the systematic approach adopted by the Brussels group to investigate the problem of segmental analysis of speech, I had a lot of trouble forming a clear understanding of their subtle analyses. For this reason I will try to briefly summarize their conclusions, at least those which particularly seized my attention.

1. Speech is considered from a psychological perspective to be an object which can be decomposed into 'units' or 'constituents'.
2. These units can be of different types and vary with regard to their size (p. 426) and/or salient aspects (p. 430).
3. The minimal units are phonemes, called 'segments'.
4. These segments "cannot be derived by simply inspecting perceptual outputs" (p. 428) but necessitate the elaboration of conscious representations (p. 428).
5. These conscious representations of utterances can be mentally scanned or analysed and allowed "intentional control of one's own motor activity" (p. 430).
6. Subjects can manifest 'segmental analysis abilities' or skills without 'segmental awareness' (p. 418), i.e. without conscious knowledge of representations of the segments (p. 419). A child can learn "a procedure that works in a particular situation" such as finding a new attack point for his response in a deletion task. This type of knowledge has been called by Piaget (1977) the discovery of regularities in opposition to a real understanding of the structure of the relations involved. By the way, I regret the absence of reference to Piaget's work (except for the term "decentration") or to the research done by the psycholinguists of the Genevan school.
7. Three criteria should allow us to attest to segmental awareness (p. 418): the first one is the ability to verbally report the segments of an utterance, the second is given by immediate succes in manipulation tasks (deletion or fusion), the third criterion suggested is learning transfer effects.

8. Segmental awareness partly depends upon basic underlying cognitive capacities: on the one hand, "decentration" "as the ability to pay attention to the expressive or phonological properties of speech while disregarding meaning", i.e. dissociating structure from content, on the other hand, "analytic competence" or "analytic operations". Subjects have to be confronted with particular experiences in order for these analytic operations to become effective.

In reference to these different statements, I would like to raise a few questions and suggest some possible answers.

If different types of speech segmentation exist based on different units or constituents, do we need to postulate different types of analytic operations, or if not, do the analytic operations have no specific role in the appearance of segmental awareness?

In their article the authors make reference to a single type of analytic operation that would intervene to explain the appearance of segmental awareness (as far as subjects have been exposed to the appropriate experiences, of course). Nevertheless, the authors are aware of the existence of other possible types of segmentation such as syllabic, which requires for them "phonetic" instead of "phonemic" awareness. Which analytic operations would explain syllabic segmentation?

Moreover, by definition, the constituents of speech (phonemes or syllables) (or the contrastive units of speech) can be composed or integrated into larger entities such as words. Do these entities (words) have the same status, are they identical when they are segmentable into syllables or in phonemes? Are the composition rules or lexical access similar when the constituents are syllables or phonemes (or more probably phonemes and syllables)? In this matter I consider it difficult to discuss segmental analysis capacities without considering at the same time the complementary abilities to compose, integrate or synthesize constituents or units of speech into configurations or totalities such as words or sentences.

Concerning rhyme, the authors claim that their appreciation and manipulation by subjects do not necessarily require segmental analysis (p. 426-427). However, rhymes are manipulated and understood by subjects who, if they are not capable of segmental analysis, are nevertheless capable of other types of decomposition or segmentation (at the syllabic level for example). Consequently, they have analytic competencies and they are able to conceive of speech as a sequence of discrete elements (different from segments), contrary to what the authors assert (p. 426). How do they conceive of speech production without any type of segmentation? When they affirm with regard to rhyme that awareness of phonological strings is not segmental awareness, it is as if subjects were incapable of any type of segmentation. It is the same when they speak about speech acquisition in two- and three-year-old children (p. 426). As we have mentioned (cf. point 2, above), they admit that "the phonology of speech may be represented, at this stage, in an unsegmented form or in constituents larger than the segment" (p. 426). If segmentation is possible, what is its nature and especially what is its relation to segmental awareness?

Concerning children from three to nine years of age, I have suggested (Mounoud, 1985) an interpretation of the development of word segmentation. Children's capacities evolve from segmentation or decomposition into syllabic constituents or components (of syllabic type) defined primarily at a semantic level of analysis (before 6 years of age) to a segmentation into phonemes based essentially on an analysis at the morphological level (after 6 years of age). Syllabic segmentation seems to me to be possible because it is based upon units which can have a reality of their own and may sometimes have their own meanings for the child, independent of the totalities into which they may be placed. In contrast, phonemic segmentation (or segmental awareness) is based on units which have been described as abstract or formal and which have no existence or meaning independent of the whole of which they are part. They can only result from breaking these totalities into parts and have no existence outside these totalities. Expressed differently, the phoneme would only exist as a part of a whole and would not be accessible to 3-, 4-, or 5-year-olds, whereas the syllable could exist on its own, independent of any larger entity which might include it as a constituent or component.

These constituents (syllabic or phonemic) would not be composed into words in a similar way: syllabic components would be organized in words as unbounded totalities by means of rules for juxtaposition or reduplication, whereas phonemic components would be organized· in bounded wholes by means of relationship systems (phonological rules).

Between these two levels of organization, a radical transformation should occur. This transformation is a kind of integration or synthesis of previous constituents corresponding to what is also called "grouping" or "chunking". Words as composed of syllables in unbounded totalities or fuzzy configurations become integrated wholes. As we have also suggested, the syllable itself would have a different status: before 6 years, the status of an independent unit (inseparable from meaning) which can be regrouped or juxtaposed with other syllables, after 6 years, the status of a part of a word essentially defined in terms of its relative position, as demonstrated by Bellefroid and Ferreiro (1979) in their study.

In addition, I have tried to generalize this description to the development of sentence segmentation (cf. Bronckart, Kail & Noizet, 1983, for a review). Different strategies have been revealed for sentence segmentation. These strategies are based on different indices: semantic, positional and formal (morphosyntactic). The passage from *pragmatic strategies* (based on semantic characteristics of lexemes or on their proximity) to *formal strategies* (based on the relative positions of lexemes or on morphosyntax as well as on semantic aspects) also takes place at around 6 years of age in our culture, with, of course, important variations depending on the kind of expressions used (Sinclair & Ferreiro, 1970).

I consider that after 6 years of age a new means of segmenting words or sentences appears; this can be explained by a *general ability to segment a whole into abstract units*. This general capacity is complementary to another *general ability to integrate elements into a whole* whose meaning and proper-

ties are not reducible to the sum of the properties of its constituent elements. The units resulting from segmentation are not of the same nature and do not have the same status as the constituent elements of the whole. The general abilities to segment and integrate are not constructed but are brought into play at different stages in development, for example at around 6 years of age, depending on the nature of the interactions of the organism with the environment but in a non specific way. These capacities only appear in relation to the realities (content) with which the child has been confronted.

I have also tried to show that these general capacities constitute prerequisites which allow the child to define simple physical objects (tools) as bounded or integrated wholes instead of unbounded configurations or fuzzy sets of juxtaposed elements.

I think it would be interesting to suggest a link between the interpretation I have presented and the one developed by Gladstone and Best (1985) in the context of reading acquisition. This hypothesis at a neuropsychological level is related to inter-hemispheric collaboration and what they call the time-integrated notion of callosal functions "when callosal function is considered across diachronic (developmental) time". Gladstone and Best refer to the model of developmental change in hemispheric involvement in complex tasks proposed by Goldberg and Costa (1981), based on differences in the cortical representation of novel versus acquired information. The right hemisphere would serve to code novel information, while the left hemisphere would be best suited for reporting already acquired compactly coded information, the sequence of knowledge acquisition following a shift from right to left hemisphere. I would suggest that the model I have presented could be based on a major change in hemispheric collaboration. With regard to my interpretation this change in hemispheric involvement would be repeated several times in the course of development, mainly at around 9 months and 6 years of age. I wonder why Morais, Alegria and Content have not made any references to the neuropsychological approach.

What I have discussed until now mainly concerns the development of segmental analysis of speech during reading and writing acquisition in the alphabetic system. This development takes place in our culture between 4 and 9 years of age. But the capacity for segmental analysis of speech gives rise to similar discussions at a very different level of development - in the course of early speech acquisition, during the two or three first years of life. Morais et al. make only a brief comment on this problem (p. 426) which I have already mentioned. From my point of view the description of the steps of early speech production has many similarities to the development of segmental analysis (Mounoud, in press). During his first year, the baby elaborates elementary components (isolated, juxtaposed or reduplicated) of a syllabic nature which come from a new perceptual encoding of the phonological strings leading to elementary representations. These representations allow the baby to produce specific articulatory patterns at the syllabic level. Thus, at around one year there is an integration of these components which gives rise to words as nondecomposable totalities. Then these wholes become decompo-

sable (segmentable), first into syllabic units defined by their relative positions in the words, and then into more abstract phonemic units (Menyuk & Menn, 1979; Dromi, 1986).

If my interpretation is well-grounded, we are confronted with one of the most striking aspects of the ontogenesis of behavior in children: the repetition of this sequence of changes throughout the course of development. It is clear that it cannot be a simple repetition but a reconstruction by means of other types of encoding systems. Only the basic mechanisms of the construction would be repeated. This is the theoretical position I have tried to develop over the past years (Mounoud, 1981, 1982, 1983, 1985, in press; Mounoud & Hauert, 1982; Mounoud & Vinter, 1981, 1985).

Through the forum of the CPC, I hope the Brussels group will respond to my point of view which would be difficult not to qualify as Genevan even if it is seen as deviationist!

References

Bellefroid, B. de, & Ferreiro, E. (1979). La segmentation du mot chez l'enfant. *Archives de Psychologie, 47,* 1-35.

Bronckart, J.P., Kail, M., & Noizet, G. (1983). *Psycholinguistique de l'enfant. Recherches sur l'acquisition du langage.* Neuchâtel et Paris: Delachaux et Niestlé.

Dromi, E. (1986). The one-word period. In I. Levin (Ed.), *Stage and structure* (pp. 220-245). Norwood, NJ: Ablex.

Gladstone, M., & Best, C.T. (1985). Developmental dyslexia: The potential role of interhemispheric collaboration in reading acquisition. In C.T. Best (Ed.), *Hemispheric function and collaboration in the child* (pp. 87-118). New York: Academic Press.

Goldberg, E., & Costa, L. (1981). Hemispheric differences in the acquisition and use of descriptive systems. *Brain and Language, 14,* 144-173.

Menyunk, P., & Menn, L. (1979). Early strategies for the perception and production of words and sounds. In P. Fletcher & M. Garman (Eds.), *Language acquisition: Studies in first language development.* Cambridge, England: Cambridge University Press.

Mounoud, P. (1981). Cognitive development: Construction of new structures or construction of internal organizations. In I.E. Sigel, D.M. Brodzinsky & R.M. Golinkoff (Eds.), *New directions in piagetian theory and practice.* Hillsdale, NJ: Erlbaum.

Mounoud, P. (1982). Psychological revolutions during childhood. In T.G. Bever (Ed.), *Regressions in mental development: Basic phenomena and theories.* New York: Erlbaum.

Mounoud, P. (1983). L'évolution des conduites de préhension comme illustration d'un modèle du développement. In S. de Schönen (Ed.), *Le développement dans la première année.* Paris: P.U.F.

Mounoud, P. (1985). Similarities between developmental sequences at different age periods. In I. Levin (Ed.), *Stage and structure* (pp. 40-58). Norwood: Ablex.

Mounoud, P. (in press). The ontogenesis of different types of thought: Language and motor behaviors as non-specific manifestations. In L. Weiskrantz (Ed.), *Thought without language.* Oxford: Oxford University Press.

Mounoud, P., & Hauert, C.A. (1982). Development of sensori-motor organization in young children: grasping and lifting objects. In G. Forman (Ed.), *Action and thought: From sensori-motor schemes to symbolic operations* (pp. 3-35). New York: Academic Press.

Mounoud, P., & Vinter, A. (1981). Representation and sensori-motor development. In G. Butterworth (Ed.), *Infancy and epistemology: An evaluation of Piaget's theory* (pp. 200-235). Brighton, England: Harverster Press.

Mounoud, P., & Vinter, A. (1985). Development of self-image in 3 to 11-year-old children. In V. Shulman, L.C.R. Restaino & L. Butler (Eds.), *The future of Piagetian theory: The neo-Piagetians.* New York: Plenum Press.

Piaget, J. (1977). *L'abstraction des relations logico-arithmétiques.* Paris: P.U.F.

Sinclair, H., & Ferreiro, E. (1970). Etude génétique de la compréhension, production et répétition des phrases au mode passif. *Archives de Psychologie, 40,* 1-42.