Vygotsky-Luria-Leontiev’s School of Psycholinguistics: the Mechanisms of Language Production

T.V. Akhutina

Moscow University
Department of Psychology

In commemoration of Aleksey Alekseevich Leontiev
A.A.L.’s objective -

• to integrate various approaches to obtain “a self-consistent theoretical framework”
• one inheriting L.S. Vygotsky’s approach

Vygotsky: «Analysis into units»

• as a unit possessing «all qualities of the whole», A.A.L. identifies an elementary action, that is a «cell» of activity (1969, p.263).
• A.A. considers psycholinguistics as a theory of speech activity
An act of speech has its motive and goal and consists of three phases:
planning,
realisation,
control.

(after A.N. Leontiev)

Planning ~ inner programming

Realisation ~ grammar          lexical
           operations                  operations

Inner programming:
- «A model of future» (N.A. Bernshtein),
- “Plan” and “Image” in the T-O-T-E (G.Miller, K.Pribram, E.Galanter),
- a component of speech, in which “pouring” of thought into speech begins (L.S.Vygotsky)

A.A. Leontiev, 1967, 1969
Scientific foundations of psycholinguistics

Vygotsky-Luria:
- a principle of systemic structure of higher mental functions
- a principle of dynamic organisation and localisation of higher mental functions

Bernshtein, Vygotsky, Luria:
central neural system phylogenesis follows the principle of accretion (over-growing)

The principle of «accretion» (over-growing)

Cf. «embodied cognition»:
“language… emerges from, and is intimately linked to, the more evolutionarily entrenched sensorimotor substrates that allow us to comprehend (auditory/visual) and produce (motor) it.
(Dick at al., 2005, p.238).
The principle of “accretion” (over-growing) was used as a foundation of the classification of aphasias proposed by Luria.

A.R. Luria hypothesised that functioning of speech areas demonstrated both characteristics common with areas they had emerged from and their own specific characteristics.

Lesions of premotor area of the left frontal lobe (including frontal speech area) leads to the impairment of serial (successive) organisation of movements and also of speech: articulation sequencing, syntactic organization, text programming.
According to the principle of systemic structure of higher mental functions, a syndrome of aphasia includes:
primary defect,
system consequences,
compensatory reorganization.

A set of primary defects causing different types of aphasias =
a set of operations necessary to generate and comprehend speech.
This provides an opportunity to construct models of speech generation and comprehension.
«…a theory presented in Leontiev, 1969 is a generalisation of the speech generation model proposed in collaboration with T.V. Ryabova (Akhutina)»

(Leontiev, 2003, p.113)

LANGUAGE PRODUCTION MECHANISM

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+ Acoustic control
LANGUAGE PRODUCTION MECHANISM
(Ryabova -Akhutina, 1967/2003 –
J. of Russian and East European Psychology, v. 41)

- Grammatical structuring
- Motor (kinetic) programming

Efferent Motor Aphasia

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LANGUAGE PRODUCTION MECHANISM
(Ryabova -Akhutina, 1967/2003 –
J. of Russian and East European Psychology, v. 41)

- Construction of inner speech schema of utterance

Dynamic Aphasia
LANGUAGE PRODUCTION MECHANISM

Semantic Aphasia

Acoustic - mnestic Aphasia
LANGUAGE PRODUCTION MECHANISM

**Acoustic control**

**Selection of word meanings**

**Selection of word forms**

**Selection of sounds**

(guided kinesthetically)

**+**

**Sensory Aphasia**

**Afferent Motor Aphasia**
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**LANGUAGE PRODUCTION SCHEMA**  
(Akhutina, 1989)

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**ACTS of “LIVING DRAMA of VERBAL THINKING”:**

- motive
- thought
- inner speech
- semantic layer
- outer speech
"The movement of thinking from thought to word is a developmental process. Of course, it is not an age related development, but a functional development”

(Vygotsky, v.1, p. 250).

Uncovering of the inner logic of the drama… of development, of the dynamic linkage of its separate acts and adventures is the main objective… of our investigation.

(Vygotsky, v.5, p. 273)

THOUGHT

“any thought strives to unit something with something else, it has movement, flow… it fulfills some function, solves a problem.”

(Vygotsky, v.1, p. 280)
Lesion of Left Frontal Lobe

Retelling of the text after reading repeated three times:

One man had a hen... She walked... putted on flesh...

After the forth reading:

One man had a hen... She lived and let to live others, picked up seeds, worked hard... and thanks to it lived...

(Luria, 1966)

(One man had a hen which laid gold eggs. The man liked to have more gold and killed the hen. But nothing was there.)

Lesion of Left Frontal Lobe

A structure of the story that should be stored and retrieved voluntarily, is being simplified and substituted with an involuntary flow of associations.

Controlled processes of information processing suffer and are being substituted by automatic processes.
“any thought strives to unit something with something else, it has movement, flow... it fulfills some function, solves a problem.”
(Vygotsky, v.1, p. 280)

This dynamic aspect of thinking suffers in cases of left frontal lobe lesions.

“Thought is always something whole... What is contained simultaneously in thought, unfolds sequentially in speech.
(Vygotsky, v.1, p. 281)
Global holistic strategy of information processing suffers in cases of right hemisphere lesions.

1. On the first one… a woman seems to hand-knit / and a man is doing something else… /
2. Here one man meets another man /
3. Here two men talk to each other/ a woman is also present... /
4. There is a tea party here //
5. Here one man offers a cigar to another one
6. Here a woman treats two interlocutors and offers them vine /

7. Here he is pretty drunken / two people are yawning / and one man is smiling / 8. And this man tells a pretty interesting story to those two / those two are listening to him //
9. Here one man sets the clock back or forward, and another one pours himself some wine /
10. ... one in either full up / or whatever / and another one is still merry / he is drinking / he hasn’t had enough probably/ ... 11. I don’t completely understand this one / one is among those two / he lies as a drunkard //

(An example by V.Y.Kotsovskaia and M.A.Gritsyshina)

FRAME –

a piece of knowledge or a data structure representing stereotypic visual information
Pronounced difficulties in comprehension and recollection of material in patients with right hemisphere lesions (holistic strategy weakness) could be explained through the lack of support from **frames, or contextual cues.**

Frames with their situational «quasiperceptual» organisation allow to maintain the integrity of the semantic field and protect against associations that are far from the current situation.

**Conclusion:**

Left hemisphere supports the dynamics of utterance “*unfolding*”, whereas the right one secures the semantic **integrity.**
INNER SPEECH


Inner speech becomes externalized when processes of semantic and surface syntaxing suffer (due to Broca area lesions) – Akhutina, 1975, 1989.

EXTERNALIZATION OF INNER SPEECH

Stories after a set of pictures «A balloon has flown away»

Kids and a grandchild… grandfather… and a balloon… and a lad…
Granny! Granny! Balloon! Balloon!
A journal, no, not a journal -- book… Pioneer… a bench…
here… The granny… saw… kids… a balloon… very good… very good… a bench… a balloon… Sun.

(An example by M.K. Shokhor-Trotskyaya)

1. A grandfather gives a balloon to his grandkids. There is a schoolboy sitting on the bench by them and reading a book.
2. Kids play with the balloon.
3. The balloon flies away and hitches of the tree.
4. The schoolboy reaches the balloon.
5. He returns the balloon to the kids.

Kids -- kids a baloon. Kids were walking to... to... oh, no... A boy and a girl. Sun... Kids were walking. The balloon fell down, no thread... Pioneer - pioneer a baloon tree. The pioneer the balloon – «Here!» Kids – very thanks.

(An example by M.K. Shokhor-Trotskaya)

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A HIERARCHY OF PREDICATES

The contents of the picture is in the **attentional field** of a speaker. (S)he *focuses attention* on a certain component of the picture and marks it with an **inner word**. This word becomes a representative of all the implied mental contents. It “absorbs” the attentional field, i.e. becomes loaded with situational meaning (sense). The situational meaning (sense) is maintained and protected by the actualised **frame (script)**.

There are stable forms of semantic development of discourse – **genres**. There are also stable forms of semantic integrity maintenance – **frames (scripts)**.
Utterance construction is **polyphonic**, it can be considered as a «**real drama of verbal thinking**».

Methodology of psycho- and neurolinguistics

**Vygotsky-Luria:**
- a principle of systemic structure of higher mental functions
- a principle of dynamic organisation and localisation of higher mental functions
Confusion of primary and secondary defects: some examples

16-36 months old infants with left temporal lobe lesions demonstrate delayed development of both speech comprehension and speaking.

The conclusion is usually that in infants of this age, as opposed to adults, speech generation is supported by posterior areas of left hemisphere (Thal et al., 1991; Stiles et al., 1998; Finlay, 2005; Dick, 2005).

2. Denial of differences between syntactic and lexical mechanisms.

1st argument: active use of two-word syntactic constructions emerges only given a certain volume of vocabulary (Bates at al., 1988).

2nd argument: normal subject demonstrate behaviour similar to agrammatism under perceptual and cognitive stress (Bates at al., 1994).

3rd argument: at a certain stage of training, a neural network model demonstrates a well-known “overregularisation” effect (bringed instead of brought).
A claim concerning difference of syntactic and lexical mechanisms

Access for words like *gave* is mediated, as a whole form, through temporal lobe systems.

Forms like *played* require the simultaneous access of the lexical content associated with the stem *play* (primarily mediated by temporal lobe systems), and of the grammatical implications of the [-d] morpheme (primarily mediated by inferior frontal systems).

(Marslen-Wilson, Tyler, 2005).

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