Pair Interaction between a Preschool Child and an Adult and a Peer in Problem Solving

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June 20 – 24 , 2010

Introduction

L. Vygotsky defined cooperation with other people as 'a closer source of the development of internal individual properties of the child's personality' in his article 'The Problem of Age' (1934).

We were interested how preschool children use **speech** and **tutorial interventions** (in Russian it is 'help') as tools for managing their joint activity in problem solving.

Aims

This research investigates the child's pair collaboration with an adult and a peer, its content, structure and efficiency and the dynamics of age-related characteristics of pair collaboration of 5 and 6-year-olds.

Hypothesis

Content and structure of pair interaction depend on the child's age, partner, and influence the efficiency of joint problem solving.

Methodology

- **Cultural-historical psychology** by L.S.Vygotsky
- Works on **joint activity** in developmental education by V.V.Rubtsov, L.F.Obukhova, G.A.Tsukerman
- **Theory of Activity** by A.N.Leontiev
- **'Pair technique'** by L.I.Bozhovich and L.S.Slavina
- **Concept of scaffolding** by J.Bruner and his colleagues

# Alexei Leontiev, Lidiya Bozhovich, Alexander Zaporozhets

А.Н. Леонтьев   Л.И. Божович   А.В. Запорожец
начало 30-х г.г.

Beginning 30 years

'Pair technique' by L.I.Bozhovich and L.S.Slavina

The pair technique allows us to investigate one child through another child. The main strategy of pair technique is to form a new action or function in settings of interaction.

The model of pair interaction structure
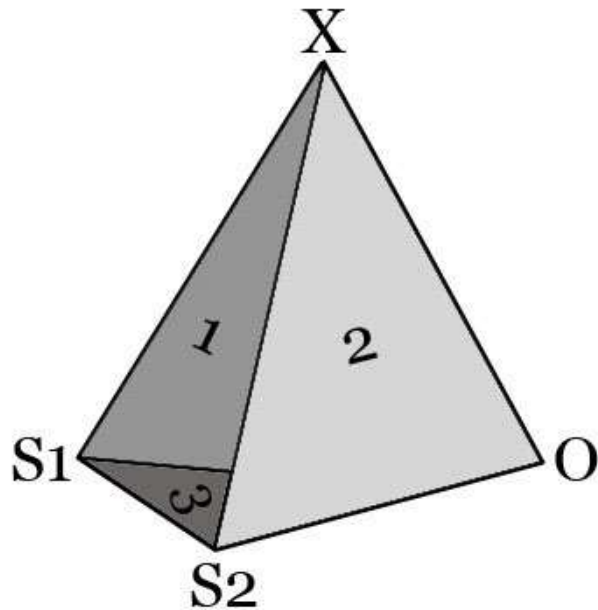
S_1 and S_2 – subjects, O – object,
X – tools and signs,
S_1 and S_2 – agreement line

Participants, procedure and data analysis

- 46 children participated in this study. They were equally divided into two groups:

23 5-year-olds (an average age of 5.5 years) and

23 6-year-olds (an average age of 6.4 years).

- 37.5 hours video-recorded data,

  356 situations of task-solving.

- 2171 utterances and 2309 interventions were registered and analyzed.

Methods

- The Diagnostic test – The Kaufman Assessment Battery for Children **«KABC-II»**.

- L.S.Vygotsky's **instrumental method** and L.I.Bozhovich and L.S.Slavina's **pair technique**.

- **Experiment** with two conditions of interaction (collaboration with an adult and a peer).

- The **Frequency analysis** on experimental research video-recording.

Research design

The solving of puzzle-matching task was organized in **4 series**:

1. **Independent solving** of a simple puzzle-matching task,

2. **Tutoring under adult guidance** (solving of simple and medium-complicated puzzle-matching task),

3. **Collaboration** with an **adult (group A)** or **a peer (group B)** (solving of simple, medium-complicated and complicated puzzle-matching tasks),

4. **Independent solving** of medium-complicated and complicated puzzle-matching tasks.

Problem solving task.
Computer program 'Joint puzzle'
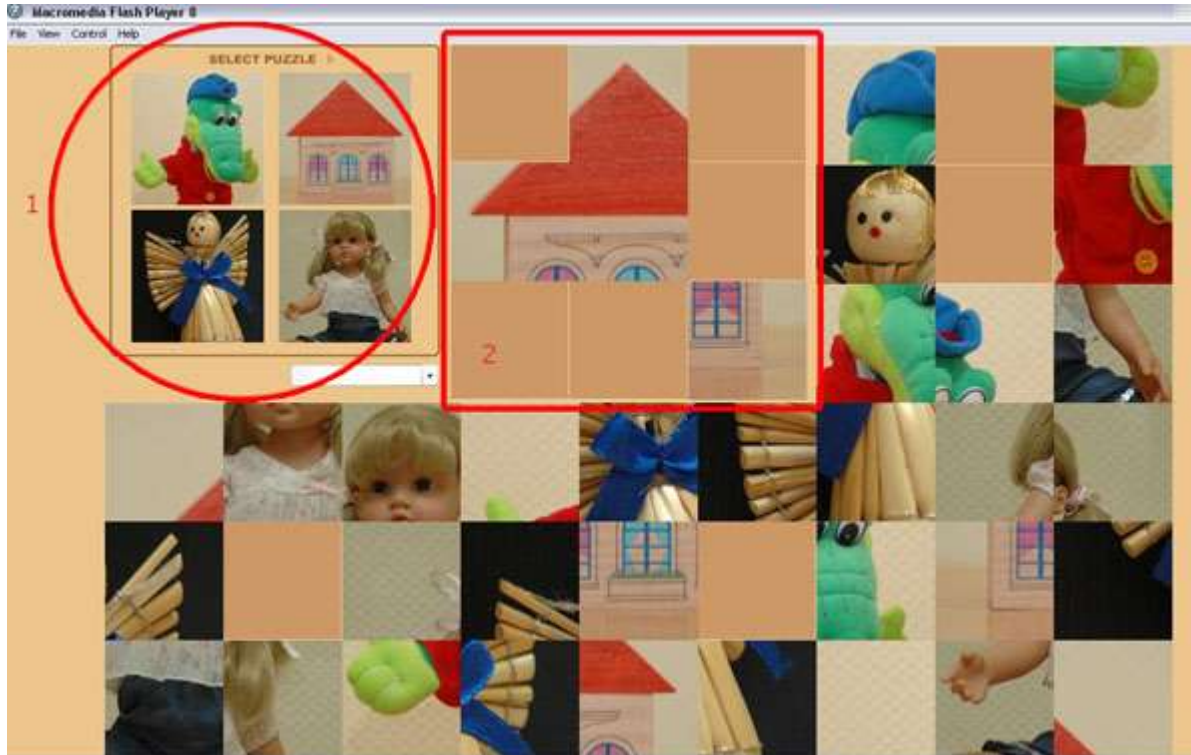
1 – Set of 4 pictures

2 – Working field. First task 'The house' is a picture

Child has matched four pieces from nine

It is correct!	It is correct piece, but it is wrong place!	This piece is from another picture!

Computer program feedback

Characteristics of analysis

- Efficiency of activity,
- Utterance,
- Interventions

Efficiency of activity is counted by the formula: (Minimum quantity of moves / Actual quantity of moves) / completion time.

Minimum quantity of moves equals a working field (3x3, 4x4 или 5x5).

Typology of utterances

Social speech

- *Help*: Where is it? Here? This one? Help me.

- *Management of partner's actions*: I will show! Move it up! Lower. Into the corner. In the middle.

- *Care of partner*: Well done! You made it! Thank you. Let's try! Go ahead!

- *Control and evaluation of actions*: That's fine. Excellent! Very good! Wrong way! Not that one.

- *Independent utterances*

Private speech: I cannot find the nose. Where is the nose? Take it. Where is the hat?

Typology of tutorial interventions

- ***Showing***

Actions are carried out silently.

- ***Showing and verbal direction***:

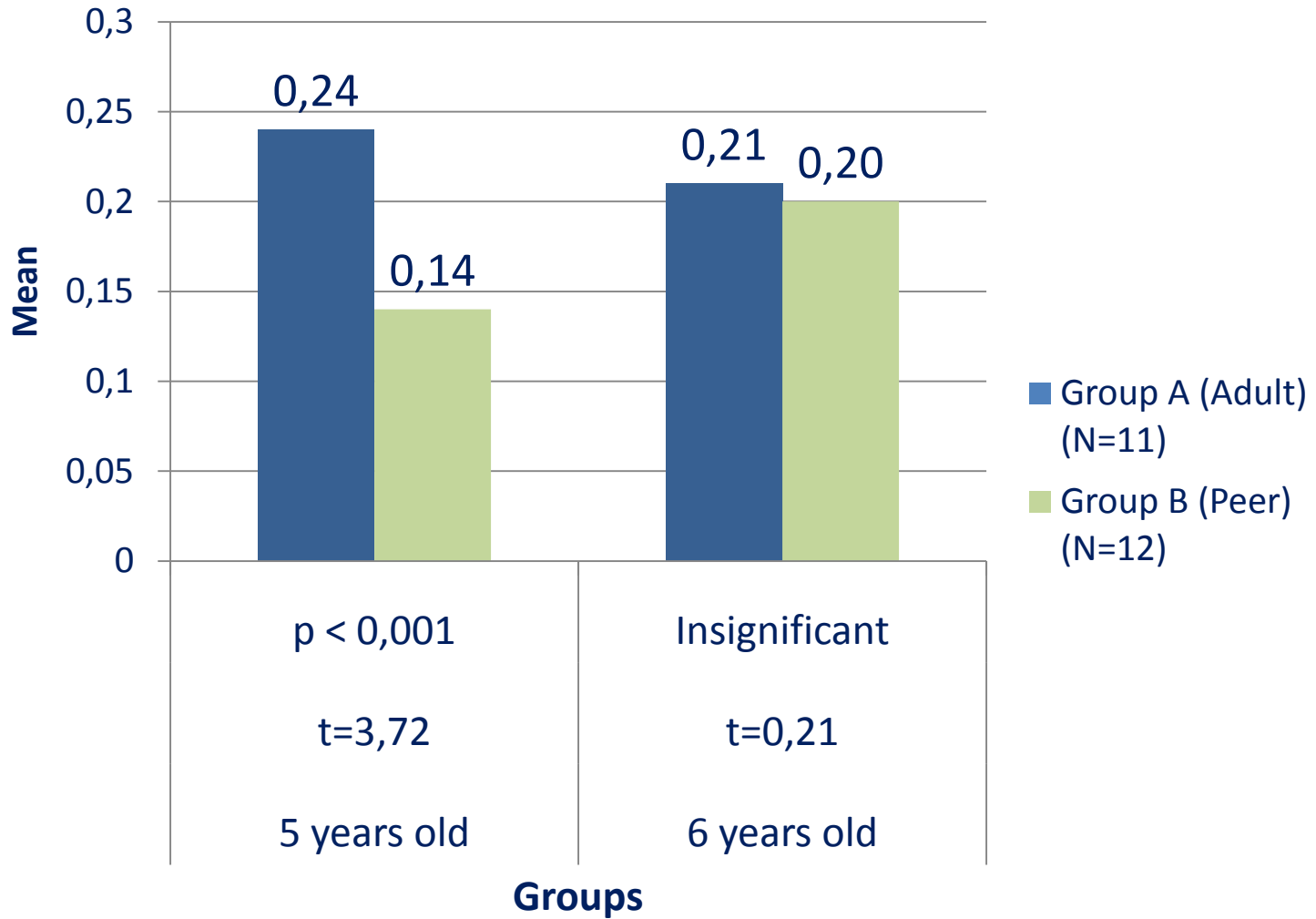Take this one!

- ***Verbal direction and reminder of the rules***:

Look at the picture! It is my turn.

- ***Verbal correction of actions***:

Click it. Move it up! Lower.

Results

Collaboration efficiency of puzzle-matching performance

Results. Speech analysis

- The 5-year-olds in interaction with a peer use **social speech** 3 times more often, than in interaction with an adult.

They use more the following social utterances: **management, care, control and evaluation**.

- The 6-year-olds in interaction with an adult **ask for help** from them and use **private speech** 6 times more often, than in interaction with a peer.

Results. Tutorial interventions analysis

- Adult uses **verbal interventions** in collaboration with 5-year-olds 1.5 times more often, than a peer.

- The 6-year-olds use '**showing**' help more often, than an adult.

Pair interaction content

Variables	Component		
	1	**2**	**3**
Verbal correction of actions	**,888**	,113	–,033
Showing and verbal direction	**,848**	–,095	–,221
Verbal direction and reminder of the rules	**,788**	,012	,193
Speech 'Help'	**,549**	,484	–,096
Private speech	–,005	**,919**	–,095
Speech 'Control and evaluation'	,217	**,834**	,362
Independent speech	–,073	**,735**	,221
Speech 'Care'	,005	,225	**,737**
Speech 'Management of partner's actions'	,270	,410	**,649**
Showing	,251	,142	**–,616**

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

The model of structure and content of pair interaction
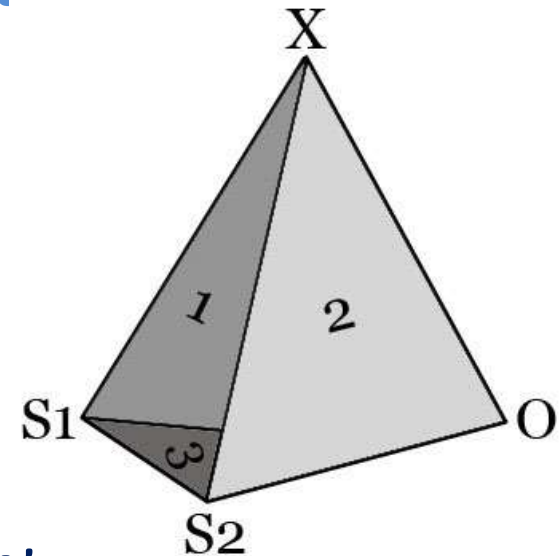
1st space is a '**Instrumental support**'
Triangle $S_1 - X - S_2$: verbal interventions, speech 'Help'.
2nd space is a '**Independent competence of action**'
Triangles $S_1 (S_2)) - X - O$: 'private speech', speech 'control and evaluation' and independent speech.
3rd space is a '**Support and coordination between partners**'. Triangle $S_1 - O - S_2$: utterances: 'care', 'management' and 'showing' intervention

Children collaboration

6-year-olds

5-year-olds

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