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THE RECOGNITION OF NON-VERBAL MESSAGES EXPRESSING EMOTION BY CHILDREN WITH SLI AGED 4 TO 7

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SUMMARY

Background:

SLI is a dysfunction defined by difficulties in acquiring one's native language, ones which appear to be primary. Apart from the language code, there are two more codes which play a significant part in the process of communication: the paralinguistic and nonlinguistic code, often described together as nonverbal communication. The goal of our research was to find answers to the question: does the ability to recognize the facial and vocal expression of emotion follow the same course in children with SLI as in their contemporaries with typical development of speech (TDS)?

Material/ Methods:

The study was conducted on 131 children with typical development of speech and 76 children with SLI aged 4.0 to 6.11 years. Employed was an experimental method called Emotional Recognition (Czaplewska, 2012).

Results:

The ability to recognize the signs of facial expressions of emotion increases with age and children with SLI achieve similar optimal results as their peers with TDS. Those with SLI recognized better than did children with TDS the vocal signs of emotion. In the case of so-called contradictory messages, for children with TDS the most important in receiving the message is its content while for children with SLI its non-verbal signs of emotion.

Conclusions:

The results of these studies cast doubt on the suggestion that the source of problems for children with SLI is not only the symbol-meaning relation, but also the social dimensions of the context of speaking. It rather appears that problems of language acquisition contribute to difficulties in social learning.

Key words: auditory perception, child, comprehension, facial emotion, SLI

INTRODUCTION

Specific language impairment (SLI) is a dysfunction defined by difficulties in acquiring one's native language, ones which appear to be primary. In other words, not caused by other, greater or universal problems. In these cases children possess at least average intelligence, a relatively good comprehension, and no neurological or serious somatic disorders which could cause such linguistic problems. These children are not raised in circumstances of extreme deprivation, and are not ill more often than their peers. But they simply are not able to speak or speak much less than their peers.

So far, it has not been possible to discover the causes of SLI. Research results on the genetic conditions for SLI are equally inconclusive. Much of the available data indicates that children with SLI come from families with various kinds of language-development problems, something that is true of anywhere from 20% to 75% of cases in this group (Bishop et al., 2003). The family members found to have language problems are typically parents or siblings, or both. As a general rule these are fathers and brothers more often than mothers and sisters, which is consistent with the proportions of males to females among persons with SLI.

According to some authors (cf. Rutter, 2008) SLI is probably conditioned polygenically, or a single gene may cause only the risk of SLI, which will develop only under particular environmental conditions. Each of the individual internal or environmental components probably produces only a small effect. It is only when combined that they produce the symptoms of SLI. Research has shown that children with SLI have problems mainly with expression and fewer problems with comprehension.

It is characteristic for SLI that all aspects of language are impaired, though language profiles differ during a life-span. While children with SLI have problems mostly with lexis and phonology, adults with SLI have difficulty with syntax and morphology.

Research (Oetting et al., 1995) has shown that children with SLI have problems with both encoding words and accessing them in their personal lexicon). Their particular lexical difficulties consist above all in problems with extracting the target word from the mental lexicon in a phonologically correct form. These problems may be caused by either insufficiently coalesced word representations or difficulties with access to the internal lexical network.

There are many possible barriers interfering with access to the mental lexicon. Such factors as memory or attention may be of considerable importance in this context (Lipowska, 2012). Researchers have emphasized that children with SLI perform at a worse level than controls in combining words with their referents, while school children with SLI have more difficulties than their contemporaries in remembering a list of known words, and experience considerable problems in recalling them (Leonard, 2000).

While the available literature contains a great deal of data about language production, there is much less data pertaining to the comprehension of language

by children with SLI. As a general rule it is assumed that the reception of speech remains within normal limits for most persons with this disorder (Reed, 2012).

On the other hand, in research work carried out in English (Bishop, 1999; Tallal, 2000) we frequently encounter reports of major difficulties in SLI with auditory perception. According to Tallal (2000), the particular symptoms experienced by children with SLI in the perception of speech sounds arise from problems with temporal processing, that is, the processing of stimuli that change very quickly over time.

While the available literature contains a great deal of data about language production, there is much less data pertaining to the pragmatic skills of children with SLI.

We know that apart from the language code, there are two more codes which play a significant part in the process of communication: the paralinguistic and nonlinguistic code, often described together as nonverbal communication. Owing to the components of the paralinguistic code such as prosody, it is possible to convey a lot of information modifying the content of the utterance only by means of tone, intonation and accent. The nonlinguistic code comprises a few independent sub-codes e.g., facial expression, sensory information (smell, touch, sight), appearance or the behavioral matching of the interlocutors.

And of course the emotional dimension of the message is extremely important in the process of communication because it often determines the interpretation of the real intention of the sender towards the receiver (Frank and Ekman, 2004). Adequate reading emotions is essential for proper social behavior (Marcinkowska, J., Lipowska, M., Szczuka, Z., 2013).

On the basis of our previous research (Czaplewska, 2009, Czaplewska & Lipowska, 2008) it turns out that in the case of ambiguity in communication, younger, as opposed to older children, attach more significance to voice intonation, whereas older children prefer the content of the message as the main indicator of information.

In the present research we checked if children with Specific Language Impairment (SLI) behave in the same way as children with typical development of speech (TDS)

MATERIAL AND METHOD

The basic goal of our research was to find answers to the following questions:

1. Does the ability to recognize the facial expression of emotion follow the same course in children with SLI in the age bracket 4.0 to 6.11 as in their contemporaries with typical speech development (TDS)?
2. Do participants with SLI recognize vocal signs of emotion better, worse or in the same way as children with TDS?
3. What is the most important aspect of the message in the case of so-called contradictory messages for children with SLI compared with TDS: linguistic content or emotional voice signals?

To find answers to these questions we used an experimental method called *Emotional Recognition* (Czaplewska, 2012), which allows for the estimation of the interpretation of emotions presented both facially and vocally. The method consists of three tasks.

The first task was based on some very well known methods, for instance Paul Eckman's and Wallace Friesen (Eckman et al., 1997) research on the recognition of emotion.

Consequently we used photo material containing the faces of men and women. Children were shown pairs of pictures presenting the following emotions expressed facially: sadness, joy, fear, anger and repulsion. The pictures were accompanied by questions such as: *Who is in this picture? What do you think about these people? What do they feel? How do you feel when you make such faces?*

In the second task sound and picture material was used. A CD recording of random words such as (in their English translation): *butterfly, dog, doll*, was used, spoken by a man or a woman in such a way so that the tone of their voice expressed one of the five emotions: sadness, anger, fear, repulsion and joy. (*now I think that it would have been better if I had used nonsense words, (for instance: non-words, like: abr, abr, abr or adra, adra, adra, because normal words like dog or doll have connotations)*). The child's task was to listen to the recording and point to a facial picture of one of the five emotions which were presented on the faces of the people in the photos.

The third task, *Recognizing a discrepancy between the content of a message and intonation*, involved a child listening to a sequence of five recorded sentences. Each sentence had a clear content and carried a clear emotional message conveyed by the speaker's intonation, however, this was contradictory to the content of the message. In other words, we had a recording of some people saying different words in different tones of voice. For instance: a very sad woman said: *Today is my happiest day*. The child's task was to listen to the recording and, from a selection of 8 photos (4 women and 4 men), point to the one which showed an adult expressing an emotion which in the child's opinion was identical to the one expressed in the recording. The person conducting the study additionally made sure that the emotion indicated by the child was in fact the emotion which they really had in mind, for instance by asking: *Did you mean (did you have in mind etc.) sadness?*

Participants

The study was conducted on 131 children with typical development of speech (TDS) and 76 children with SLI aged 4.0 to 6.11 years.

The clinical group, consisted of:

- 33 children in the age bracket 4.0 to 4.11;
- 24 children in the age bracket 5.0 to 5.11;
- 19 children in the age bracket 6.0 to 6.11.

All children from the clinical group had below-average scores on the Polish Logopedic Screening Test (Tarkowski, 2002), while 66 children were of average intelligence and 10 of above average intelligence, as measured by the Polish version (Jaworska & Szustrowa, 2003) of Raven's Colored Matrices.

The control group consisted of 136 children with typical speech development (TSD), including:

- 31 children in the age bracket 4.0 to 4.11;
- 61 children in the age bracket 5.0 to 5.11;
- 44 children in the age bracket 6.0 to 6.11

All of the participants were native Polish speakers

RESULTS AND DISCUSSION

The results achieved by both study groups in recognizing facial expression are shown in Figure 1. Answers which defined the emotion precisely were accepted, whereas such answers as: *he's almost crying, there is something wrong with him*, were not accepted. If there was a really difficult problem with speaking, the child could simply point to the pictogram of the emotion. This procedure was verified earlier. In fact the majority of even 4-year-olds could say for instance "smile" or "she's angry".

An analysis of variance indicates that the differences between the mean scores of the two groups are not statistically significant at any age.

This competence increased with age, independent of language development with $F(2, 206)=7.444$ and $p=0.001$.

As we can see, the differences between the scores of the four- and five-year olds and between the scores of the four- and six-year-olds are significant.

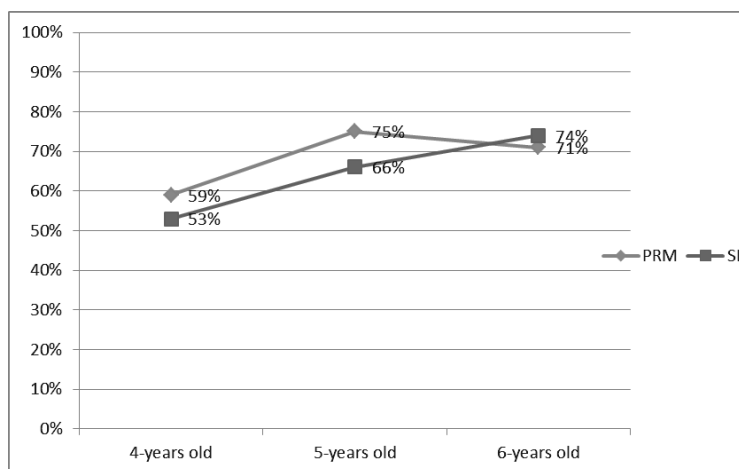


Fig. 1. The percentage of children with SLI and TSD who correctly recognized the facial expression of emotions

Age	Age	Mean difference	Relevance
4	5	-.141*	.002
	6	-.168*	.001
5	4	.141*	.002
	6	-.027	.599
6	4	.168*	.001
	5	.027	.599

*The average difference is significant at the particular level

Fig.2 The significance of differences between the results of age groups regardless of the level of language development

GROUP	Age	Average
TDS	4	39%
	5	43%
	6	44%
	Mean	42%
SLI	4	53%
	5	51%
	6	66%
	Mean	55%

Fig.3 The percentage of children who correctly recognized emotions through intonation

So we can say that children with TDS and children with SLI improve their competence of recognizing facial expression of emotion according to age and there is no difference between the two groups.

Recognizing emotion through intonation

As has been stressed above, differentiating between emotions on the basis of the intonation of one's voice is a phenomenon which developmentally precedes the differentiation on the basis of facial signs. In the light of this, it is interesting to observe the distribution of results concerning the decoding of emotions on the basis of the intonation of voice by the children taking part in the study.

In the next figure we have the percentage of children who correctly recognized emotions through intonation.

An analysis of variance indicates that the competence of recognizing emotions through intonation is rather constant at each age level and the differences between the age levels are not statistically significant, but as we can see in Figure 4 that the differences between the average results of children from the two groups (SLI and TDS) are statistically significant with $F(1,06)=10.911$ and $p=0.001$.

So we can say that participants with SLI recognized the vocal signs of emotion better than children with TDS.

Recognizing a discrepancy between the content of a message and intonation

Considering the fact that, as has been already observed in the introduction, numerous authors stress the superiority of the non-verbal message in adults, it

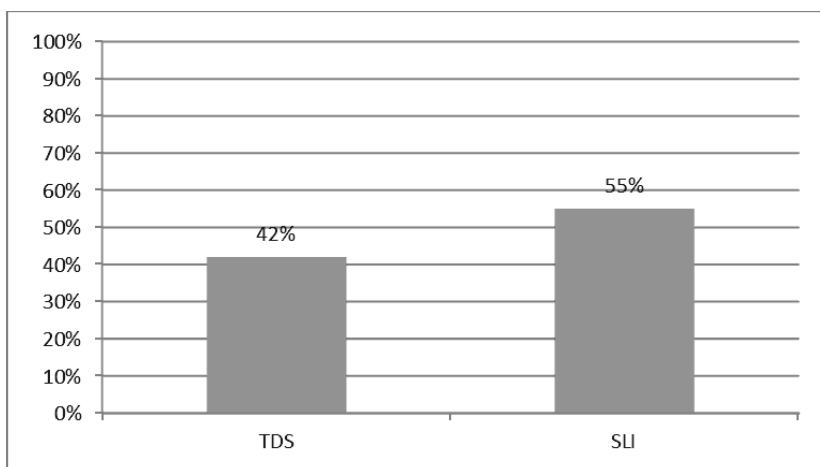


Fig.4 Average levels of correct responses in recognizing emotional expression from intonation in both groups regardless of age

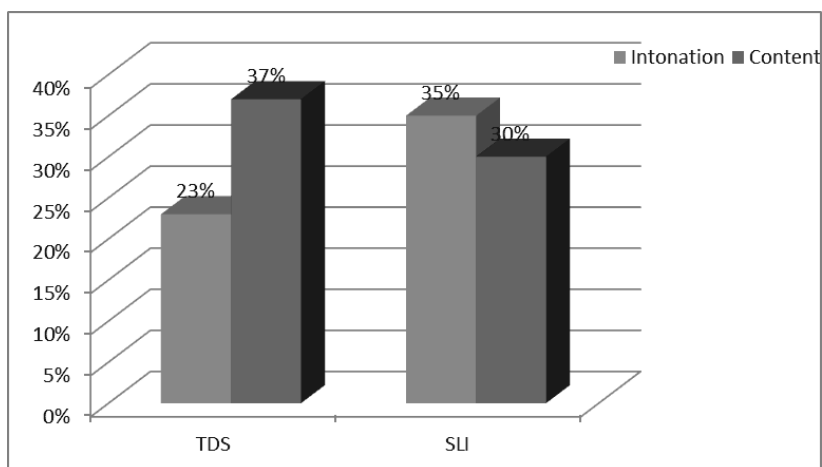


Fig.5 Children's preferred channel of information in situations of contradictory communication

seems interesting to consider how children interpret sentences whose content expresses one emotion and yet whose intonation expresses another contradictory emotion.

As we can see in Figure 5, in situations of contradictory communication, children with typical speech development are guided mainly by the content of the communication ($F(1,201)=6.596; p=0.011$). In the case of children with SLI the difference in the number of children who preferred content to intonation is not statistically significant, despite the fact that there was a tendency to choose intonation as the main channel of information.

Additionally, if we make a comparison between the two groups (children with TDS and with SLI), we can see that the difference between the groups who chose intonation as the main channel of communication is statistically significant

with $F(1.206)=11.639$; $p=0.001$; as is the difference between those who chose content as the main channel of communication with $F(1.201)=5.043$; $p=0.026$.

As we can see, five-year-olds in the TDS group of children have a tendency to understand the expression of the sender in accordance with the spoken content (a trend that continues even in the six-year-olds). The opposite is true for children with specific language impairment because the number of children who see intonation as the primary factor in interpreting the message increases. The fifth year of life seems to be the moment at which many children with typical speech development start to pay more attention to the verbal content of an ambiguous message.

It may be that children with SLI, having experience of the everyday difficulties of interpreting spoken messages, generally try to understand the meaning of the utterance by paying attention to the tone of voice.

Already by their sixth year children with SLI, despite their language deficits, pay more attention to the content of speech, like their peers with TDS. This happens at least in terms of relatively simple syntactic structures.

The results indicate that in a situation of ambiguity, children with normal speech development give priority to aspects of the content of speech, and children with a specific language disorder give priority to intonation. Our results confirm that, for children with TDS, language and their linguistic picture of the world are the primary source for interpreting utterances.

Probably, while a linguistic picture of the world is taking on increasing importance in the formation of mental representations for their peers with TDS, children with SLI continue to rely mainly on perceptual indicators.

In contrast, for children with SLI, non-linguistic clues are more important. It can be said that the children with specific language disorder who we studied have problems at the level of the reorganization of experience (Karmiloff-Smith, 1992; Awdziejew & Habrajska, 2010), when language starts to become increasingly important and allows one to go beyond the current perception data.

Because of the difficulty in verbalising their experiences, children with SLI probably have a problem in the process of creating an adequate cognitive representation. Children with SLI cope worse with the processes of reorganizing existing knowledge and creating new, more adequate scripts than children with TDS. Hence, the occurrence of behavior in children with SLI which is rather one-dimensional, and associated with a given, current situation.

Typical characteristics of the reception of utterances by children with SLI include the proper recognition of non-verbal signs of emotions and gestures (stronger than in their peers who speak well), paying attention to physical context stimuli (Czaplewska, 2012), as well as adequate, somewhat intuitive recognition of simple communication intentions (Czaplewska and Sterczyński, 2012).

The results of these and other (Czaplewska, 2012) studies cast doubt on the suggestions of some authors (e.g., Rice, 2007), who believe that the source of problems for children with impaired language development is not only the symbol-meaning relation, but also the social dimensions of the context of speaking.

It appears rather that problems of language acquisition contribute to difficulties in social learning. If the sender bases his speech mainly, or only, on non-verbal behavior, preschool children with SLI can probably understand the meaning of the speech as well as their TDS peers. In contrast, if the statement is grammatically complex, children with specific language impairment have difficulty in adequately understanding the sense of the speech.

Undoubtedly, the development of children with SLI and unfavorable biological and environmental factors are intertwined with each other. According to Pačhalska, Jastrzębowska Lipowska, Pufal (2010), specific language impairment (SLI) consists in a complete or partial lack of the normal organization of language processes (phonological, semantic and/or syntactic) caused by the instability of the brain systems responsible for language, resulting from hereditary and environmental factors. According to Pačhalska et al. „system” means a set of components that all interact under the influence of existing forces. The system is stable if the forces are in sufficient balance whereby the arrangement of the elements relative to each other stays the same, or changes at a predictable tempo.

The immaturity of certain regions of the brain in a child, or even bad linguistic upbringing can lead to instability within the language system. According to the authors, if such factors occur before the emergence of hemispheric specialization, before the formation of „speech centers”, you cannot talk about the formation of correct language. When, as a result of SLI, the system is unstable, the other systems (cognitive, emotional, family, social) are often destabilized. That is why it is so important to begin the therapy of children with SLI as soon as possible.

CONCLUSIONS

Our conclusions are as follows:

1. The ability to recognize facially expressed emotions increases with age. This process shows the same development in children with SLI and children with typical language development.
2. Children with SLI are better able to recognize emotion expressed through intonation than children with typical language development.
3. In the case of contradictory communications, children with typical language development choose the content of the communication concerning emotion as the main indicator of information, more often than children with SLI.
4. The practical application of this is that therapists besides improving language skills in children with SLI, should also concentrate on developing their ability to recognize non-verbal signals. We should play to their strengths as well.

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