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# THE USE OF APPLIED BEHAVIOUR ANALYSIS TECHNIQUES IN REDUCING SELF-INJURIOUS BEHAVIOURS IN A THREE-YEAR-OLD AUTISTIC GIRL

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## SUMMARY

### Background

*Self-destructive behaviours have been extensively described in the literature on the topic. The aetiology of such behaviours remains unknown. They are very dangerous to the patient. The treatment of this disorder represents an enormous challenge. Commencement of therapy follows an analysis of the factors which cause self-injurious behaviours to continue.*

### Material/ Methods:

*The assessment of behaviour changes is based on the analysis of the data from the therapy conducted by using applied behaviour analysis to reduce self-destructive responses. The ABC research model was applied, in which A means baseline measurement, whereas B and C are the subsequent stages of therapy.*

### Results:

*Appropriately selected behaviour analysis techniques are very successful in reducing self-injurious behaviours. Functional behaviour analysis made it possible to decide on the course of action that was taken and that eventually eliminated all self-injurious responses.*

### Conclusions:

*Our research has demonstrated that therapy for self-injurious behaviour ought to be based on the assumptions of applied behaviour analysis, i.e. on reinforcing desirable behaviours and withholding rewards for self-injurious responses. A consistent and uniform manner of responding to difficult behaviours on the part of the persons in the immediate surroundings constitutes a very significant element of therapy.*

**Key words:** *childhood autism, functional analysis, reinforcement*

## INTRODUCTION

The relevant literature contains an extensive description of self-injurious behaviours, the factors that influence their occurrence, and the types of injuries resulting from self-destructive responses. Although numerous studies on the issue have been conducted, the aetiology of such behaviours remains insufficiently known.

Self-injurious behaviours are defined as behaviours which lead to inflicting pain or physical injury to oneself (Tate et al., 1966). Such behaviours are markedly varied, differing in terms of location, duration and intensity. Included in the category are both mild responses and those capable of directly endangering the sufferer's life (Matson, 1989).

Numerous factors, such as health condition, previous experience, the social context and new situations, cause self-injurious behaviours to occur. Furthermore, numerous studies have shown that self-injurious behaviours occur more often in people suffering from pervasive developmental disorders, e.g. autism and Asperger's syndrome, and people with intellectual disability.

Self-injurious behaviours are very dangerous for the patient and constitute an enormous challenge to persons conducting therapy.

Over the last thirty years, most research has concentrated on establishing the meaning of such behaviours, in order to find the most successful methods of eliminating them. The most successful of all have been the methods based on operant conditioning (Bachman, 1972; Baumeister et al., 1976; Frankel et al., 1976; Johnson et al., 1978; Romańczyk et al., 1975). Nearly all courses of action described in the literature included elements of applied behaviour analysis. They showed the successfulness of differential reinforcement of incompatible behaviours when applied to self-injurious behaviours (Lovaas et al., 1965; Tarpley et al., 1979). Other studies have shown the successfulness of a timeout (Duker, 1975; Solnick et al., 1977) or reconstruction (Harris & Romańczyk, 1976; Foxx & Martin, 1975).

### **Functional analysis of self – injurious behaviours**

In her paper, Carr (1977) pointed to the necessity of analysing the factors which cause self-injurious behaviours to continue. Such behaviours persist because they may be positively reinforced by other people's attention and interest. They are also sometimes negatively reinforced by withdrawing instructions or requests when self-destructive behaviours appear. Sometimes the consequences of certain behaviours are themselves reinforcing, as the person inflicting injury to themselves may find the feeling of pain pleasurable.

The complexity of the factors that cause self-injurious behaviours to continue suggests that it is difficult to find one effective therapeutic technique which would bring about a permanent improvement.

The research conducted by Iwata (1994) aimed at discovering the factors that influence the appearance and retention of self-injurious behaviours. The

results show that these behaviours markedly vary in terms of frequency and form, both in an individual and among people. The outcome of these observations indicated that intensification of self-injurious behaviours is not coincidental, as certain external factors influence their occurrence and duration. This allows one to confirm the assertions made by Carr (1977) that self-injurious behaviours are retained as a result of various reinforcements coming from the surroundings. These may be either attention or interest on the part of others, or an opportunity to receive an attractive object or perform a favourite activity. The results based on behaviour analysis allow one to select the appropriate therapeutic methods. The factors which reinforce self-injurious behaviours must be withheld or considerably limited when self-injury occurs; however, they must be used to reward desired behaviours. For instance, if a child presses its eyeballs in order to increase visual sensations, one may use various lights or special toys based on visual stimuli to reinforce the desired behaviours (Favell et al., 1982). However, extinction-based methods ought to be used at the same time, consisting in eliminating or reducing the physical sensations derived from certain self-injurious responses (Rinconer & Devany, 1982).

The research conducted by Iwata (1994) has also indicated that in some patients self-injurious behaviours occur when something is demanded or requested of them. Such behaviours function as an escape, their purpose being to evade following the instructions received. Withdrawing such demands at the moment when injurious responses occur represents a reward for such undesired responses and leads to their repetition and intensification in similar situations in the future. It is necessary to include an effective system of motivating desired behaviours, viz. following instructions and performing tasks. At the same time, in order to increase the effects of learning it is necessary not to focus on auto-destructive behaviours or comment on them.

Iwata's observations have shown that self-injurious behaviours may also fulfil several functions simultaneously. A given response may at the same time give pleasure, allow one to avoid demands and attract the attention of others.

An appropriately conducted self-destructive behaviour analysis is essential to undertaking appropriate therapeutic procedures.

### **Treatment methods for self-injurious behaviours**

The objective of every therapy is to select appropriate methods based on the conclusions drawn from the functional behaviour analysis. The behavioural therapist takes steps aimed at not providing reinforcement for aggressive behaviours and teaching alternative and desired forms of response. The literature on the topic has described various techniques producing both a reduction of the number of self-injurious responses and a development of deficit behaviours. One must bear in mind, however, that certain ways of responding may be effective in the case of certain unfunctional behaviours and completely ineffective in the case of behaviours of another category.

The most significant task at the beginning of therapy is to create a system of motivation that will encourage the child to cooperate. The motivation system must be simple and easily understandable to the child, and the rewards for the tasks performed must be very attractive and immediately accessible. Each reinforcement system must be adjusted to suit the interests and needs of the child.

Choosing appropriate rewards is the basic factor that determines the effectiveness of the therapeutic procedures applied. A therapy may lead to the desired changes in behaviour provided that the reinforcements are correctly selected.

The child's parents, teachers and therapists should concentrate on the reinforcement of the desired behaviours and the development of the deficit behaviours throughout the day, both at school and at home. Commenting on undesired behaviours and focusing on the pupil's failures are a grave mistake. The objective of therapy is to increase the child's motivation to learn and deal with its setbacks. An appropriate and uniform motivation system enables the child to develop and significantly improve its life.

Occasionally, the tasks that we perform with a child manifesting self-injurious behaviours are excessively difficult for the child. The following question arises: what to do to cause the child to succeed quickly and receive rewards for exercises done correctly? What we need to do is use prompts in an appropriate way. A prompt is defined as any kind of help given by a teacher or parent immediately after providing an instruction, the purpose of which is to increase the probability of a desired response taking place (Cooper, 1987). Prompts are given at the initial teaching stages or in situations when the child commits errors and fails to deal with the task. The aim of the therapist is to stop giving prompts as soon as possible and help the child to be able to deal with tasks on its own, i.e. without any assistance on the part of the teacher. A successful accomplishment of an instruction must be immediately rewarded. We invariably make use of an individualised reinforcement system.

A very significant element of a therapy is the appropriate mode of issuing instructions to the self-injuring patient. One must remember to issue instructions in a clear, gentle and polite tone. An instruction is to be given only once: one should avoid repeating it several times. If there is no response, one must not shout, raise one's voice or prolong one's utterance. If the child does not follow the instruction, prompts are to be used. We concentrate our efforts on causing an appropriate response to occur after every instruction. Orders and questions must suit the child's listening comprehension skills.

In reducing self-injurious behaviours, all reinforcement-based techniques prove very successful (Foxy, 1982). One of them is DRO (Differential Reinforcement of Other Behaviour), which is based on reinforcing the lack of occurrence of self-injurious behaviours within a period of time specified in advance. For example, we set a timer for five minutes and if no self-injurious responses occur within that time, the child is given rewards. Another well-

known technique is DRA (Differential Reinforcement of Appropriate Behaviour), which is based on reinforcing desired behaviours such as following instructions, completing tasks and cooperating with the teacher. Another very successful technique is DRI (Differential Reinforcement of Incompatible Behaviour), in which the therapist rewards behaviours which are incompatible with the undesired responses. For instance, if we know that the child hits itself on the head when it sees a bottle of drink, we teach it – before an undesired response appears – the correct form of behaviour, i.e. by way of pointing to a bottle with a finger or, in the case the child can speak, by saying, ‘Give me a drink.’

The factor that determines the success of therapy is a consistent and uniform manner of conduct. Self-injurious behaviours will never be eliminated if the child is rewarded when a self-destructive response takes place, e.g. if it is given an attractive object, if it focuses the attention of others on itself or avoids completing a task or following an instruction.

The technique known as sensory extinction is extremely helpful in reducing self-injurious behaviours (Cooper, 1987). This extinction is based on withholding the reinforcing stimulus. Very frequently a person manifesting certain self-injurious responses derives pleasure from pain or other bodily sensations. The task of the therapist is to limit, or, whenever possible, to completely eliminate the person’s access to those pleasurable sensations which are directly connected with self-injurious behaviours. For example, if a child bangs its head against a hard table top, we put a thick soft mat on the table to minimise the pain. If the child forcefully hits its feet on the floor, we may put soft socks and thick-soled shoes on the child’s feet. However, if protecting the child or the objects around it proves impossible at a given moment, we must, as much as possible, limit its access to the place where the self-injurious behaviours occur.

## **MATERIAL AND METHODS**

The aim of our study was to find effective behaviour analysis methods which could be used to reduce self-injurious behaviours in a three-year-old autistic girl (“Kasia”). To analyse our results we used the ABC research model (Bailey, 2002), in which stage A means the baseline measurements, whereas the measurements conducted at stages B and C show the behavioural changes that result from our therapeutic activities.

The behaviour measured was banging the head against the floor, hard objects, or furniture, as well as hitting herself on the head with hard objects. The baseline was measured for three consecutive days during the therapy, i.e. between 8.30 am and 1.00 pm. At five-minute intervals, the therapist marked in a special worksheet the occurrence of self-destructive responses within the time elapsed. The data was then shown on a graph as the percentage of time when the self-injurious responses occurred. During the measurement, the only intervention used was preventing the girl from hurting

herself. While the baseline measurement was being taken, not only was the frequency of the incidence of the self-injurious behaviours noted, but also a functional behaviour analysis was conducted. The therapists observed Kasia at the kindergarten, at school and during walks. Each time a self-injurious response occurred, the situations immediately preceding the response and its consequences were recorded.

The baseline measurement data pointed to the necessity of launching therapy aimed at reducing the number of self-injurious behaviours. To attain this objective, applied behaviour analysis was used, while particular therapeutic methods described by experts on the issue were selected on the basis of the conclusions of the functional analysis. Throughout the therapy, self-injurious behaviours were recorded. The data was collected on a daily basis and projected on a graph in the same way as when the baseline was measured, i.e. using a worksheet with five-minute-interval measuring. The results were shown on the graph as the percentage of time with undesired behaviours within four-and-a-half hours of therapy conducted in the kindergarten.

## **CASE STUDY**

Kasia first came to our unit in October 2007 at the age of one year and nine months. The reason why her parents decided to seek help was some alarming symptoms: she did not interact with her twin brother in any way whatsoever, she did not react to her name or instructions, and she was showing numerous peculiar and repetitive behaviours. Her parents were also worried about her intensive self-injurious behaviours.

To diagnose the disorder, the child's parents were interviewed and her behaviour was observed. The study of her medical history was aimed at analysing all the potentially meaningful factors connected with the prenatal period, birth, and early development. Kasia comes from a complete family: she has a twin brother and a sister who is two years older. The family lives in good domestic and economic conditions. Kasia was born by Caesarean section, the birth took place in an appropriate time, and Kasia was given 10 Apgar points. According to the parents, her early motor development was normal, and such skills as sitting and walking appeared at the usual time and developed normally. The only worrisome symptom was a dislike of being hugged and held in someone else's arms. When the diagnosis was being done, Kasia displayed a range of social behaviour disorders: she did not make eye contact, she did not look at others when her name was called or when she wanted to receive something (Markiewicz, 2009). She was not interested in the people from her immediate environment, i.e. her parents and brother, and made no attempts at communicating or interacting with another person. Kasia could not play or use objects correctly.

Her verbal behaviours, i.e. both listening comprehension and speaking, were also seriously impaired: she did not understand the most basic instruc-

tions, nor did she distinguish the names of objects in her surroundings. Kasia did not speak, she made no sounds aimed at communication with others or gestures that would compensate for her lack of speech.

When Kasia's behaviour was observed, numerous incorrect and repetitive behaviour and activity models were noted, realised in the form of stereotypical patterns, e.g. taking objects to her mouth, walking on her toes and bent knees, shaking her head and placing toys in the same places.

On the basis of the observations and the medical history, Kasia was diagnosed with autism according to the diagnostic criteria of DSM IV-TR.

From November 2007 until September 2008, Kasia was under the care of the diagnostics-consultation unit at the Institute for Child Development (Instytut Wspomagania Rozwoju Dziecka – IWRD) in Gdansk, Poland. At home, her parents applied the programme established by the IWRD specialists. In September 2008, Kasia began therapy at the IWRD Kindergarten for Children with Autism. Kasia spent 22 hours a week at the kindergarten and 20 hours a week at home. Every day, when the kindergarten classes were over, Kasia exercised with her parents or volunteer workers.

The main premises of the programme were to develop the deficit areas and to teach behaviours alternative to the undesired ones. The teaching sessions were short and adjusted to the girl's age, and the tasks were conducted in the form of play. Great emphasis was laid on creating a motivation system, the aim of which would be encouraging Kasia to cooperate. The rewards were adjusted to the patient's age and preferences.

Sphere analysis was the basis for developing the outline of the educational programme. Each task was recorded once a week, and the data obtained put on graphs, so as to make it possible for to examine progress on a running basis. In the 2008/2009 school year, Kasia went through 74 educational programmes in the ICD and 45 programmes at home. The specific tasks were aimed at developing her ability to spend leisure time, match and establish interactions with her peers, and at developing her verbal imitative skills, her active speech, speech comprehension, gross-motor skills, and early education skills.

Reducing undesired responses constituted a very important element of the therapeutic procedures. The repertoire of Kasia's reactions included stereotypic behaviours, protests, acts of defiance, and shouting. However, what posed the greatest problem was her self-injurious behavior, immediately endangering her health or, in some situations, even her life.

A functional analysis of Kasia's self-injurious behaviour was carried out with a view to determining efficient procedures.

Table 1 contains an analysis of the particular situations in which the self-destructive responses – head hitting – were noticed. It contains a description of the factors preceding the occurrence of the self-injurious behaviour and the consequences following a specific response.

It also happened that the undesired responses occurred at times when Kasia was playing with something she liked very much, when she did not see

Table 1. Baseline functional analysis of self-injurious behaviour – head banging – carried out in September 2008

Antecedents	Behaviour	Consequences	Functional analysis
The sight of attractive objects	Throwing herself on the floor and banging her head against it, banging her head against walls and furniture, hitting herself on the head with a hand or with hard objects	Offering the object	Reinforcing self-injurious response by offering a reward
Possibility of performing attractive activities		Doing a favourite action	Reinforcing self-injurious response by making a reward accessible
Prohibitions: “You can’t do that!”, “No!”		The child keeps performing the action forbidden to her	Reinforcing self-injurious response by continuing an attractive activity
Orders / Requests		The child fails to follow the order / request	The self-injurious response is reinforced by the possibility of avoiding an order / request
No other persons in the same room		The room is entered by an adult person who addresses the child	The self-injurious response is reinforced by focusing the attention of other persons on oneself

any other attractive objects, when her parents were staying around and did not bother her with any requests. In such situations it was difficult to determine the function of the self-injurious behaviour: most probably, the undesired responses were reinforced automatically – by the sensations coming from the child’s body.

## RESULTS AND DISCUSSION

The functional analysis of Kasia’s self-injurious responses demonstrated that many of her self-destructive reactions kept reoccurring because they were positively reinforced, they enabled her to avoid complying with instructions, and they attracted the attention of the persons from her immediate vicinity. The method of coping with this difficult behaviour as applied by the parents, consisting in hugging the girl strongly until she calmed down, proved to be inefficient: one could even notice a greater number of self-injurious responses in her. We therefore developed a new mode of proceeding with Kasia, which was targeted at reducing the instances of self-injurious responses. The target behaviour of the therapeutic program was defined as the girl’s refraining from banging her head against the floor and hard objects during various everyday situations and learning occasions.

The following techniques, aimed at reducing the number of self-injurious responses in Kasia, were used at both stages of the therapeutic procedures:

1. motivating the girl to cooperate in a proper way: the use of an individualized motivation system, including numerous rewards that were attractive to Kasia;
2. avoiding concentration on undesired responses – at the moment of the occurrence of the self-injurious responses, they were not commented on.



An important thing at the time of their occurrence was ensuring safety to Kasia;

3. refraining from reinforcing the self-destructive responses – at the moment of the occurrence of the undesired responses the child was not given any attractive things;
4. continuing tasks – whenever the self-destructive responses took place at the moment orders were being given to the child, they were not dropped, though possibly the grade of difficulty of the exercise was lowered;
5. using proper prompts – in the case of performing new tasks or tasks representing difficulties to Kasia, the girl was given prompts that were mainly based on modelling;
6. giving instructions in a proper way – articulating short and clear orders to Kasia, understandable to her, and uttering them in a nice, quiet voice;
7. using techniques based on reinforcing desired responses – instead of making use of reinforcement in situations in which no self-destructive responses occurred, the following techniques were introduced:
  - DRO – reinforcement applied if undesired behaviour was not displayed during a designated time period;
  - DRA – reinforcement of behaviours alternate to self-injurious behaviours, i.e. of the child's fulfilling her tasks quietly, cooperating with the teacher and of adequate playing;
  - DRI – reinforcement of incompatible behaviours competing with the self-injurious behaviour, i.e. of adequate formulating of requests and dealing with the requests.

Such behaviours were taught to Kasia throughout the day and rewarded in a way that was specifically preferred by her;

8. consistent responding – uniform behaviour of all the persons in Kasia's social environment, both at school and at home;
9. sensory extinction – securing Kasia's learning places in such a way so that she would have no possibility of banging her head or other parts of the body against hard surfaces, e.g. by upholstering the floor, her chair and her table with soft mats.

All the above mentioned procedures were used at both stages. The stages of the therapeutic procedures varied in the following way:

### **Phase one**

*Procedure:* The moment the first symptoms of undesired behaviour or self-injurious behaviour occurred, the instructor began to give simple orders to Kasia, which had earlier been exercised with her during therapeutic sessions. Such orders were short, clearly formulated and understandable to the girl (e.g. "Clap your hands" / "Say 'a'" / "Raise your hands"). Kasia was also asked to perform simple activities, such as constructing something with building bricks or constructing a simple jigsaw puzzle. If Kasia began to fulfil the orders or engaged herself in performing a simple activity, she was immedi-

ately rewarded with tokens. Upon collecting all the tokens she could exchange them for an attractive material reward. If she failed to follow the orders, the teacher gave her manual prompts and continued providing instructions to her up to the moment when Kasia began to accomplish them unaided. At the same time, the girl was secured against self-injury.

*Purpose:* Those actions were designed not to allow the occurrence of the self-destructive responses or aimed at the disrupting undesired behaviours as soon as possible, by teaching the patient how to respond to simple orders. All the activities offered by the teacher or a parent were alternative to or incompatible with the self-injurious behaviour.

### **Phase two**

*Procedure:* At the second stage, the whole structure of the situation of teaching was changed. Kasia was transferred to another room in which she learnt by herself. The room had been divided into three, distinctly separated zones that varied considerably. The first was the “learning zone,” with Kasia’s table and a chair, as well as some aids for her to use in accomplishing her tasks. During the teaching sessions, great emphasis was placed on reinforcing the desired behaviours (fulfilling orders, a nice sitting posture, looking at the teacher, etc). All desired behaviours were rewarded with tokens. On collecting all the tokens, Kasia moved to the second zone, to the so-called “playing zone”, where she exchanged them for a specific reward (her favourite toy, a relish or an activity). A board with photos of all the rewards available, just like the toys and relishes themselves, was placed in the second zone. Kasia was allowed to play there, listen to music, eat the relishes, watch fairytales etc. The place was colourful and arranged in such a way as to make it very attractive to her. However, if Kasia demonstrated self-injurious behaviours in the course of the implementation of the teaching procedures, she was led to the third zone, to the so-called “silent zone”. This place had been specially adapted, divided from the rest of the room by a wardrobe, with nothing representing any attraction to her. The whole place was covered with soft mats securing both the walls and the floor, which was meant to secure Kasia against the effects of her self-injurious responses. There was only a small table and a chair, also covered with soft materials. A similar division into zones was also arranged in Kasia’s room at home, which made it possible for her family to react to her undesired behaviours throughout the day.

*Purpose:* The purpose was to teach the principle to Kasia that if she followed orders, behaved quietly and learnt eagerly, she might play in the playing corner with all her favourite toys as a reward. On the other hand, if she engaged in self-injurious behaviours, she would not be given any rewards, and she would have to perform a simple activity (collecting building bricks) in a completely unattractive place. The division into zones was meant to considerably increase Kasia’s motivation to be willing to enter into appropriate cooperation with the teachers and parents, and to encourage her to accomplish her tasks.

In the course of the second phase, Kasia began to take Rispolept (6 May 2009), and she continued taking it for a period of about two months. In view of the appearance of undesired reactions to the medication (including the severity of her phobias), the medication was withdrawn. On account of irregular EEG recordings, Kasia began to take Depakine in July.

Fig. 1 shows the influence of the above mentioned therapeutic methods on the frequency of occurrence of self-injurious behaviours.

What follows is a detailed description of the data shown in Fig. 1.

*Baseline.* On the vertical axis (y) there has been shown the percentage of time in which Kasia engaged in self-injurious behaviours, whereas the horizontal axis (x) shows the number of days. On average, the baseline was 18%, which means that she engaged in self-destructive behaviours for almost 50 minutes every day. After three days, the baseline was suspended, because the graph was characterised by a growing tendency, which prompted a recommendation for immediate commencement of therapeutic procedures.

*Phase one.* The procedures applied in Stage One were started on 7 September 2008. The objective of the first phase was prevent the occurrence of self-injurious behaviours by teaching Kasia to respond to simple orders. For 13 days after the onset of the procedures, the self-injurious behaviour remained the same, at an average level of 17% of the total learning time involved in self-destructive behaviour, with an intensity ranging from 10% to 27%. The persistence of the self-destructive behaviour was caused by the withdrawal of the reinforcing consequences after instances of its occurrence. Kasia kept trying to exact the desired changes around her by resorting to her old, fixed patterns that had always proved effective up to that time (banging her head against objects). In the third week following the commencement of

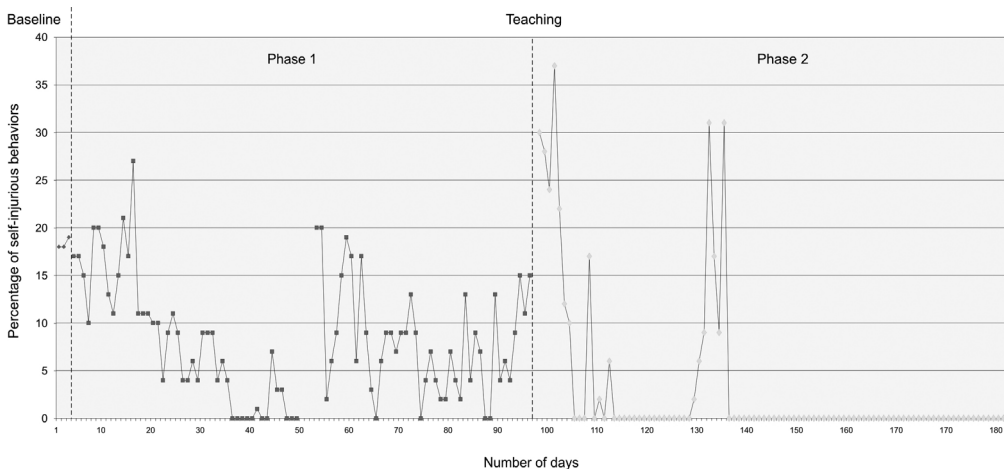


Fig 1. Percentage of time in which self-injurious behaviours appeared at baseline and the change of behaviour following therapeutic procedures at Stage One and Stage Two

the intervention, the self-injurious behaviour gradually began to decrease – to 0% on the 35<sup>th</sup> day of the treatment, where it remained until the 50<sup>th</sup> day of treatment. After the holiday break, which lasted for three weeks, the self-injurious behaviour increased up to the level of 20%, i.e. Kasia would hit her head for 55 minutes a day. On the third day, the intensity of these behaviours dropped to 2%, whereas in the following days one could observe changes in the intensity of the behaviour within the range of 0 to 18%, despite the lack of any changes in the mode of intervention. Until the 98<sup>th</sup> day of therapy, i.e. until the completion of Stage One, the average level of the behaviour was 7%. Since we did not manage to return to the 0% level on a permanent basis, we took the decision to make some modifications in our therapy.

*Phase two.* We went into the second phase in April 2009. At that stage, our purpose was to teach Kasia how she could tell which of her behaviours led to receiving a reward and which to unattractive consequences, the procedure having been essentially supported by the division of the rooms into zones. On the third day of the therapeutic procedures, the behaviour increased to 37%, then it gradually began to go down until the 8<sup>th</sup> day of the treatment, when it reached the 0% level. On the 11<sup>th</sup> day of treatment, the behaviour suddenly went up to the level of 17%, only to return to the 0% level on the following day, where it remained until the 31<sup>st</sup> day of treatment. On the 32<sup>nd</sup> day, the behaviour increased to the level from the beginning of the intervention in Phase Two, i.e. to about 30%, in spite of the fact that the mode of intervention remained unchanged. After a week, the behaviour went back to the 0% level, where it has remained until 10 November 2009, that is, for the period of four consecutive months of procedure implementation. Since July 2009, in the course of the application of the foregoing intervention, the girl has taken Depakine. It is worth mentioning that, over the period from 1 August to 30 October 2009, not even a single head-hitting instance was recorded, either at the kindergarten or at home, during a walk, or other everyday situations.

## **CONCLUSIONS**

The results described here demonstrate the effectiveness of applied behaviour analysis in reducing self-injurious behaviours. Before the commencement of the therapeutic procedures, a functional behaviour analysis had been made, which showed that the occurrence of the self-destructive responses was influenced by external factors. This supports the conclusions of the research carried out by Iwata (1994), in which the author found evidence that self-injurious behaviours were closely related to specific external impulses. In our case, a large group of self-injurious behaviours, including head-banging, had been developed and retained for a long time by positive reinforcement (Carr, 1977). Frequently, such behaviours were aimed at receiving an attractive thing, a favourite relish, or at being allowed to do an activity of interest to the child, or they attracted the attention of persons from

the child's social environment. There were also instances when the self-destructive responses were a way of evading orders or requests addressed to the child. These conclusions were of great importance in determining the procedures and specific therapeutic methods.

The results of our research show that a set of properly selected behaviour analysis techniques are very effective in eliminating self-injurious behaviours. The therapy was commenced by establishing a list of rewards that were not freely accessible to the patient and which were given to her throughout the day, immediately after the occurrence of the desired behaviours. The first step of our therapeutic procedure was to demonstrate to persons from her immediate environment a new way of responding to the patient's behaviours. It was necessary to withdraw reinforcement after the occurrence of the self-destructive behaviours and to ensure that the principle be consistently observed by all persons having contact with the child. Another very important part of the therapy was reinforcing the desired behaviours (DRA) and behaviours incompatible with self-injurious behaviours (DRI) (Foxy, 1982). From the very beginning of therapy, sensory extinction was applied as well, the technique being designed to reduce Kasia's access to places or objects that she banged her head against. What proved to be a very effective method in the process of reducing self-injurious behaviours was the introduction of a clear structure in Kasia's therapy room at her kindergarten and in her room at home. When the rooms had been divided into three zones (the "learning zone", the "playing zone", and the "silence zone"), Kasia found it much easier to understand that only desired behaviours led to reinforcements, whereas self-destructive responses would never be rewarded.

Besides procedures aimed at reducing undesired responses, during the whole period of the treatment, i.e. from September 2008 until November 2009, very intensive educational sessions were also conducted, which were intended to develop Kasia's deficiency spheres, such as verbal and social behaviours, as well as to teach her how to play or act unaided on other occasions.

In July 2009, following a physician's recommendation, Kasia was given an antiepileptic drug. The EEG recording was not unambiguous, but the examination indicated the possibility of a history of temporal epilepsy. The administration of the drug failed to change her behaviour: all the time her parents and the therapists worked intensively on completely reducing her self-injurious behaviours.

The results of our therapy show the importance of medical examinations, such as EEG, MRI or other tests recommended by a physician in cases of self-injurious behaviour. It may happen that self-injurious responses are generated by diseases such as epilepsy. Where the examinations prove the existence of a disorder, the medications prescribed by a physician ought to be administered.

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