ASPECTS OF STEREOTYPIC BEHAVIOUR AMONG AUTISTIC PERSONS: A STUDY OF THE LITERATURE

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Introduction

Autistic people often exhibit apparently meaningless behaviours. Many such behaviours occur in a pattern of constant repetition. Although not an exclusive symptom of autism, such stereotypic behaviour is common among people with autism and related disorders (Cohen et al., 1987). The criteria for classifying PDD (Pervasive Developmental Disorder) in the DSM-IV mention ‘restrictive and stereotyped patterns of behaviour, interests and activities.’

Stereotypic behaviour is striking. Examples are patterns of tapping, body movements such as body-rocking and swaying, certain set hand and arm movements, characteristic facial expressions and eye movements, and repeated vocalisations. Various terms describe this behaviour, including ‘abnormal stereotyped acts,’ ‘motility disturbances,’ ‘mannerisms,’ ‘ritualistic acts,’ ‘rhythmic habit patterns,’ and ‘blindisms’ or ‘autisms’ (Lovaas et al., 1987).

Most articles about stereotypic behaviour concern the mentally handicapped. The DSM-IV mentions that approximately 75% of children with Autistic Disorder function at a retarded level. Other authors mention higher percentages, namely 80% to 90% (Kraijer, 1991; Demeyer, 1976, 1979). Dutch research indicates that about a third of the population of institutions for the mentally retarded suffer from a Pervasive Developmental Disorder (Kraijer, 1991).

Many findings about stereotypic behaviour among the mentally handicapped have played a role in conceptions about such behaviour among autistic people or people with a related disorder.

This literature study is part of an investigation about the functions of stereotypic behaviour among autistic people or people...
with a related disorder. Most literature pertaining to the topic has been reviewed; the period ranging from 1963-1996. This article examines the approaches of stereotypic behaviour in the literature. The study describes the different definitions and forms of stereotypic behaviour, the prevalent views, and the explanations for this behaviour’s emergence and continuation and its susceptibility to outside influences. The discussion identifies gaps in these descriptions.

Various Definitions of Stereotypic Behaviour

Several definitions exist for stereotypic behaviour, including some that are listed here. Baumeister (1978) mentions ‘highly consistent motor or posturing responses which are excessive with respect to rate, frequency, and/or amplitude and which do not appear to have any adaptive significance.’ Berkson (1983) describes stereotypic behaviour as ‘immature voluntary behaviours in the repertoire for a long time and out of synchrony with “normal” development, whose patterns tend to be unresponsive to environmental change.’ Lovaas et al. (1987) write about ‘a class of behaviors that are stereotyped and repetitive, appearing in a near-identical form across several members of a species, and are functionally autonomous in the sense that they can persist indefinitely in the absence of social consequences.’ Boer et al. (1994) define stereotypic motor behaviour as ‘highly consistent behaviour, characterised by repeated, rhythmic, topographic invariant movements or movement sequences that are pathological and may be functionally significant.’

Some authors distinguish between compulsive behaviour and stereotypic behaviour by autistic individuals (McBride and Panksepp, 1995). McBride and Panksepp define stereotypic motor behaviour as ‘repetitious, non-functional, self-stimulatory body movements such as complex finger or hand movements.’ Compulsive behaviour is thought to differ from stereotypic behaviour to the extent that it is purposeful and appears to follow certain rules. Their research results reveal that the distinction between purposeful and non-functional behaviour is difficult to identify.

Forms of Stereotypic Behaviour

After analysing 60 studies concerning handicapped individuals, LaGrow and Repp (1984) compiled a list of 50 stereotypic behaviours that covered a wide range. Their overview shows that the behaviours with the highest prevalence are body-rocking, mouthing, and complex hand and finger movements.

The extensive study by Werry et al. (1983) examined five rhythmic behaviours (thumb sucking, body-rocking, head banging, use of a pacifier, and attachment to a soft object) in detail. Although the prevalence varies, these behaviours generally occur among children under five and can be characterised as stereotypical.

Opinions are divided about the self-injurious nature of stereotypic behaviour. Data obtained by Wieseler et al. (1985), suggested that stereotypic behaviour and most self-injurious behaviour belong to separate response classes requiring different interventions. Rojahn (1986) demonstrated, however, that some forms of self-injurious behaviour are associated with some forms of stereotypic behaviour, whereas others appear unrelated. Many questions remain about this subject.
Views and Explanations Concerning Stereotypic Behaviour

Several perspectives exist with respect to stereotypic behaviour.

Stereotypic behaviour as undesirable or deviant behaviour

The investigator's views of stereotypic behaviour largely determine the method of study and treatment. Stereotypic behaviour is usually regarded as conduct that lacks a function and is problematic. Hettinger (1990) provides three reasons - based on twelve studies - why stereotypic behaviour is considered problematic. First, people view stereotypic behaviour as a stigma that complicates social integration. Second, stereotypic behaviour can prevent subjects from learning new behaviour, and can also impede the interest and willingness to answer or to respond. Third, stereotypic behaviour may be self-injurious in extreme cases.

Many studies afford very cursory coverage to the arguments for treating stereotypic behaviour. Intervention is often justified on the basis of stereotypic behaviour's harmful nature: it supposedly interferes with learning, adaptive functioning, and desirable interaction with the environment (Rojahn and Sisson, 1990). The large amount of studies supporting behavioural modification also suggest that such behaviour requires suppression or replacement.

Stereotypic behaviour as part of the normal behavioural repertoire

Several authors advocate regarding stereotypic behaviour as a normal aspect of development.

Certain rhythmic movements, known as secondary circular reactions, are a necessary stage in cognitive development. Infants repeat activities affecting the environment in ways that inspire their interest (Piaget, 1952). The activity involves practicing skills and continually producing desired effects. During this stage, subjects can learn deviant stereotypic behaviour if their development stagnates, and next available behaviour is lacking.

Ethological research on rhythmical stereotropies in normal human infants has shown that infants exhibit a wide variety of rhythmic and pronounced stereotopic behaviours (Thelen, 1979). Groups of stereotypic behaviours concerning specific body parts or postures have each a characteristic age of onset, peak of performance, and decline. The behaviours follow a fixed sequence throughout the different areas of the body (from the fingers to the legs to the arms to the torso and the hands). Stereotypic behaviour marks an unmistakable phase in the stages of neuromuscular maturation (Thelen 1979). The absence of rhythmic behaviour can be a greater cause for concern than its presence (Hoder and Cohen, 1983). Rhythmic patterns with a high frequency and stereotypic mannerisms among new-borns may return later under conditions of functional and structural regression (Wolff, 1968).

Guess and Carr (1991) have developed a three-level model explaining rhythm stereotypy and self-injury. Level I represents rhythmic behaviours as internally regulated and common in normally developing infants, but delayed in onset among children with handicapping conditions. Level II considers stereotypy and self-injury as adaptive responses to under- or overstimulating environments. Level III represents stereotypy and self-injury as learned behaviours emitted to control the behaviour of others.

At this point we will consider the first level, characterised by Guess and Carr as
the period in which the rhythmic behaviours are common for infants developing normally; retarded infants exhibit these behaviours later. According to Guess and Carr, the ‘behavior states’ are mostly internally regulated and potentially target adaptation. After three months, infants become independent of these state conditions. Rhythmic behavioural patterns are therefore probably ‘most state-dependent among infants and children with significant developmental delays.’

Stereotypic behaviour and homeostasis

The homeostasis hypothesis is among the hypotheses advanced to explain stereotypic behaviour. A certain stimulation level is experienced as optimal; changes in this level inspire a quest for compensating behaviours, which can be subdivided into two areas.

1. Homeostasis and self-stimulation.

Stereotypic behaviour can be self-stimulatory in the sense that it leads to perceptual reinforcement (Lovaas et al., 1987). Lovaas mentions self-stimulatory behaviour that results from operant conditioning. So many types of self-stimulation exist that they are undoubtedly acquired through a learning process. Individuals create perceptual and sensory stimuli through stereotypic behaviour. These stimuli reinforce the stereotypic behaviour. Perceptual reinforcers are not mediated through the social environment but are controlled by the individual. In this self-shaping process, individuals actually choose the self-stimulatory behaviour that suits them. Self-stimulation (i.e. the stereotypic behaviour) does not disappear by withholding outside reinforcement, but only if the behaviour ceases to satisfy individual needs.

Self-stimulatory behaviour covers a broad range. This range often makes the behaviour difficult to treat. Using behavioural modification techniques (e.g. overcorrection) to treat a certain stereotypic behaviour often causes the untreated stereotypic behaviour to increase (Rollings and Baumeister, 1981). This pattern may indicate the pursuit of homeostasis through the total repertoire of stereotypic behaviour. Other indications suggest that maintaining homeostasis involves the total of stereotypies and other movements: almost as if stereotypies were interacting with other movements (Repp et al., 1992). Lensing (1982), for example, perceived a link between turning the face away and stereotypy in autistic people. He suggests that turning the face away coincides with a reduction of perceptual input. This reduction leads to under-stimulation of the central nervous system. Social stimulation or self-stimulation through stereotypic behaviour may compensate for the deficiency. Other indications associate stereotypic behaviour with mood. A slower heart rate measured after the onset of stereotypic behaviour during negative excitement might substantiate the homeostasis theory (Willemsen-Swinkels et al., 1996).

2. Homeostasis and the influence of the environment

Stereotypic behaviours may be considered adaptive responses to over and under-stimulation by the environment. Guess and Carr (1991) present this scenario in Level II of their three-level model. One of the factors involved is the quantity of stimuli that the environment represents for people. The nature of the stimuli is also relevant.
An under-stimulatory environment provides more opportunities for stereotypic behaviour. Such behaviour replaces external stimuli. The absence of external stimuli disrupts the homeostasis; the individual seeks to restore the balance through stereotypic behaviour. Increased interaction between staff and child reduces the stereotypic behaviour (Brusca et al., 1989), as changes in sensory input do (Mason and Newman, 1990). Stereotypic behaviour also seems to decrease in environments with a higher potential for behavioural alternatives. Environmental reinforcement should, however, outweigh the stereotypic behaviour (Davenport and Berkson, 1963; Goodall and Corbett, 1982). This might indicate a certain level of arousal that the individual hopes to achieve via the stereotypic behaviour.

By over-stimulation, the individual tries to reduce the excess stimuli. Stereotypic behaviour then becomes a mechanism for regulating homeostasis. Stereotypic behaviour can increase in new and complex situations (Hutt and Hutt, 1970) and may block and regulate over-stimulation with similar and predictable self-stimulation (Hutt, 1978).

Stereotypic behaviours thus seem related to the pursuit of homeostasis (i.e. maintaining the level of stimulation). Homeostasis is attainable through (1) self-stimulatory behaviour in which the reinforcement comes from within the organism and (2) supplying self-stimuli through stereotypic behaviour to compensate for under-stimulation or to regulate over-stimulation by the environment.

**Factors Affecting Stereotypic Behaviour**

Several studies investigated the influence of different factors on stereotypic behaviour. Most explored the relationship between one or more of the following topics and stereotypic behaviour: objects (the presence of items suitable for manipulation, playthings); environment (restrictions of the situation, effect of hospitalisation, new versus familiar situations, complexity of the situation), person-specific factors (age, severity of retardation, basic level of the stereotypic behaviour), and interaction (active participation, manner of verbal contact, early isolation).

Berkson and others have conducted extensive research. They found, among other things, that stereotypic behaviour is more common among the mentally retarded when items for manipulation are absent. In distinguishing a high stereotyping group and a low stereotyping group they observed less manipulation of available objects in the high stereotyping group (Davenport and Berkson, 1963). Stereotypic behaviour is more common in new situations restricting behaviour than in familiar surroundings with opportunities for alternative activities (Berkson and Mason, 1963). Supplying playthings and addressing the test subjects appears to reduce stereotypic behaviour and to increase environment-oriented manipulation (Berkson and Mason, 1964). Berkson has concluded that surrounding influences affect the stereotypic behaviour of severely mentally retarded individuals, but only minimally (Berkson and Manson, 1963). Guess (1966) has observed a decrease in manipulation of the surroundings among subjects which show a high frequency of stereotypic behaviour.

Forehand and Baumeister (1971a) observed more body-rocking among mentally retarded individuals in an environment with restricted opportunities for behaviour than in normal group living arrangements. They also established a relationship between stereotypic behaviour...
and frustration of goal-directed behaviour. Frustration coincided with a high rate of stereotypic behaviour (Forehand and Baumeister, 1971b). Regarding stereotypic behaviour and participation in activities, Baumeister et al. (1980) noted: 'In general stereotyping was less frequent in those situations in which the child is actively participating in some activity.' For example, eating did not coincide much with stereotypy, and listening to music revealed the most stereotypy. Akyurek and Kalverboer (1982) investigated stereotypic and auto-manipulative behaviour among autistic children (the average age was 5). Contrary to their expectation, they did not observe any increase in stereotypic behaviour as situations grew more complex (i.e. more playthings and people). Auto-manipulative behaviour, however, decreased.

Age appears related to the prevalence of stereotypic behaviours (Berkson et al., 1985): 'The main consistent result from all the data is that abnormal stereotyped behaviours increase with age until the teenage period and that this effect is more marked in people who are severely mentally retarded.' Few abnormal stereotyped behaviours appear in young children; the peak is during the teenage years. This rise may be attributable to hospitalisation (Rojahn and Sisson, 1990). Figures from various studies indicate a higher rate of stereotypy among residents of institutions than among people living at home (Jacobsen, 1982; Eyman and Call, 1977). The level of mental retardation is another important factor: 'Restrictiveness of the setting as well as the prevalence of stereotypy are related to the level of mental retardation' (Rojahn and Sisson, 1990).

Rydell and Mirenda (1991, 1994) have shown that the manner in which adults talk to autistic children affects the children's verbal stereotypic behaviour. They found that immediate echolalia is more common with high constraint utterances by adults. They provided the following explanation: 'It appeared that immediate echolalia was the primary compensatory strategy used by the children to manage the adult high constraint utterances... The subjects in this investigation used the immediate echoes to fulfil their turns in the conversation'. Adult low constraint utterances, on the other hand, led to a higher incidence of delayed echolalia.

Research on stereotypic behaviour among animals demonstrated a relationship between early isolation and the emergence of stereotypic behaviour (Berkson, 1968; Davenport et al., 1966). Stereotypic behaviour and the importance of learning effects in producing and maintaining such behaviour figure in Level III of the three-level model by Guess and Carr (1991). 'Level three represents stereotypy and self-injury as learned behaviour emitted to control the behaviour of others.' Guess and Carr consider this type of stereotypic behaviours the most difficult to influence because multi-operant conditions provide so much reinforcement. A wealth of literature discusses the use of behaviour modification techniques for suppressing stereotypic behaviour (Wieseler et al., 1988; Barton et al., 1985; Bailey et al., 1983; Jones, et al., 1988; LaGrow and Repp, 1984; Dyer, 1987; Emerson and Howard, 1992). Stereotypic behaviour is usually assumed to be undesirable because it impedes normal functioning.

Learned stereotypic behaviour often enables to evoke predictable behaviour in others. Perhaps this process reflects a means of communication or an opportunity to influence the surroundings in a manner that the individual exhibiting these behaviours understands.
Conclusion and Discussion

Most knowledge about stereotypic behaviour is obtained by studying the mentally retarded, without distinguishing autistic subjects from non-autistic subjects. Many studies concern artificial situations in which the research consistently focuses on one or a few factors (e.g., the presence of objects suitable for manipulation, the complexity of the environment). The research usually takes place inside institutions with small test groups; the possible influence of hospitalisation thus remains unclear. All too often, stereotypic behaviour is automatically perceived as a disadvantage for the subject concerned. Arguments for treating stereotypic behaviour are frequently lacking, while the role of suppressing stereotypic behaviour in the process of learning desired behaviour is questionable: "Rarely do we find empirical demonstration of the clinical necessity for treatment prior to intervening with a given individual. Similarly, it is rare to find evidence that an increase of appropriate behaviour actually resulted as a function of the suppression of stereotyped behaviour. Further research may reveal that not all individuals with stereotyped behaviours will benefit from elimination of the stereotyped mannerisms, because they are not disadvantaged by their stereotyped behaviour to begin with" (Rojahn and Sisson, 1990).

In-depth research about basic stereotypic behaviour is unavailable: the assorted descriptions are based on scant empirical evidence. Frequently, a single term has a variety of meanings. People might wonder whether behaviours such as light gazing, object twirling, or posturing belong to the same group (Rojahn and Sisson, 1990). The different studies reveal many kinds of stereotypic behaviours. Many described only the striking stereotypic behaviours in detail, which may or may not correspond with the total repertoire of stereotypic behaviour in daily life. Most studies about stereotypic behaviour are dated. Nowadays the topic seems to regain attention, but the recent studies are still based on the older ones.

Many explanations about stereotypic behaviour are hypothetical and include very little coherent theory formulation. Only Guess and Carr (1991) link the different views underlying the descriptions of stereotypic behaviour in their three-level model. They cover internal regulation, homeostasis as adaptive responses to environments, and learned behaviours in a single explanatory model.

Stereotypic behaviour occurs during the first period of normal development and serves an adaptive function. Beyond this period, stereotypic behaviour may indicate a developmental disorder. Does this statement hold true for all stereotypic behaviours? Many of the stereotypic behaviours occurring among older autistic and mentally retarded individuals correspond with the behaviours of people whose development is normal. The stereotypic behaviour of both autistic and mentally retarded individuals correspond with the behaviours of people whose development is normal. The stereotypic behaviour of both autistic and mentally retarded individuals, however, often includes different characteristics, which result in a strange appearance. One such characteristic is the multiplicity of such behaviour. On this subject, Berkson et al. (1995) observe: 'This does not mean that people with developmental disabilities do not have stereotyped behaviours that are adaptive or that people with developmental disabilities cannot have both abnormal and normal stereotyped behaviours. It merely means that there are some stereotyped behaviours that are noticed as deviant because they seem to have no value in everyday life and because they are not
characteristic of the public behaviour of people who do not have mental retardation, visual impairment, and/or autism.'

Normal and abnormal stereotypic behaviours also differ considerably. The discrepancies concern their duration and frequency, as well as deviant forms and combinations. Retarded people manifested a longer duration, a higher frequency, and different combinations of hand gazing and body-rocking than non-retarded people (Schwartz et al., 1986).

The preceding account indicates the need for an unequivocal and objective description of the stereotypic behaviour (cf. also Thelen, 1979). Human ethology provides a method for describing the stereotypic behaviour objectively and in detail. We propose substituting the term repetitive behaviour for stereotyped behaviour, as it is fairly neutral. We define repetitive behaviour as behaviour that consists of an element that occurs repeatedly or of elements that occur repeatedly in the same combination with a meaning not immediately clear to the people observing such behaviour (Nijhof et al., 1995). This definition comprises only perceptible behaviour, avoids any interpretation and allows detection of forms of repetitive behaviour among autistic individuals. The view that stereotypic behaviour is non-functional, harmful to the individual, and therefore in need of suppression is of questionable validity. This view overlooks the individual nature of such behaviour. The homeostasis hypothesis assumes that stereotypic behaviour plays a role in managing or generating stimuli (Lovaas et al., 1987; Guess and Carr, 1991). Such an approach figures among the perspective for assessing possible functions of stereotypic behaviour.

Our experience indicates that practical workers are generally able to explain repetitive behaviour among autistic people; they perceive a function - albeit often an individual one - for such behaviour (Nijhof, congress paper, 1992; Nijhof et al., 1995). The practical knowledge available about stereotypic behaviour provides a basis for investigating its possible functions. A systematic description and inventory of these functions will eventually yield important information for understanding the stereotypic behaviour and may signify a breakthrough in dealing with autistic people.

**Summary**

This article reviews the different ways of describing stereotypic behaviour. Stereotypic behaviour is part of normal early childhood development. Among autistic people, however, this behaviour remains commonplace later in life. Both the prevalence and the form of stereotypic behaviour seem determined in part by the environment. Stereotypic behaviour appears related to the achievement of homeostasis, which seems to depend on both internal and environmental factors. Stereotypic behaviour also results from conditioning.

Our knowledge of stereotypic behaviour contains many gaps. Opinions vary regarding the nature of such behaviour, and the descriptions reflect various perspectives. A detailed description of stereotypic behaviours is necessary. Investigating possible functions of stereotypic behaviours in autistic people's overall behavioural repertoire is also important.
References


