Noldus
Information Technology

How to use Theme in psychology research

AUTISTIC BEHAVIOR

Reveal the organization of autistic behavior

Most parents of an autistic child notice already in the first year of their child's life that he/she is different from other children. However, few children are currently diagnosed before the age of three.

In what aspects exactly do children with a Pervasive Developmental Disorder (PDD), like autism, contrast with their peer group? Are there, for instance, differences in the level of organization of their behavior? Willemsen-Swinkels and her colleagues of the University Medical Center Utrecht, The Netherlands, addressed the latter question and compared the behavior of children with a PDD with that of normally developing children. The researchers videotaped 82 children (PDD and non-PDD) in a 40-min semi-structured playroom session after separation and reunion with one of their parents. The behavior of child and parent was coded from videotape by means of The Observer.

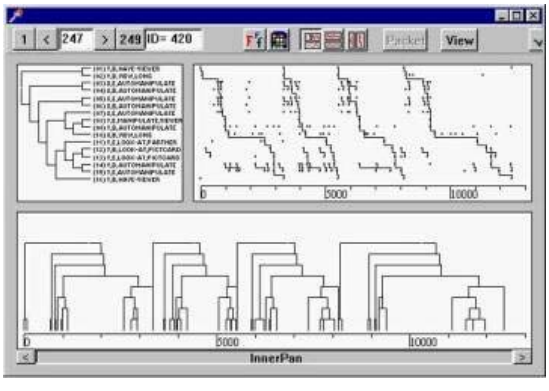

Figure 1. *Theme screenshot showing a pattern diagram. Upper left box: event types included in the pattern and their connections. Upper right box: real-time distribution of events and patterns. The dots represent event occurrences and the zig-zag lines connecting the dots represent pattern occurrences. Bottom box: real-time structure of the pattern. The lines display the connections between event occurrences*

The ethogram included elements concerning locomotion and activity of the child, distance between parent and child, communication, touches, and looking behavior. Data were exported to Theme. Theme is a professional system for detecting and analyzing hidden patterns in behavioral records.

The videotapes were also used to classify the children (PDD and non-PDD) according to the quality of attachment (the bond with their parents). The behavior of children with a disorganized/ disoriented attachment (children with a D-classification) was compared with that of age-matched children without a D-classification. Children with a disorganized / disoriented attachment are characterized by the absence of an organized strategy to deal with stress. The researchers investigated whether a D/non-D-classification had some additional meaning when children with a PDD were compared to children without a PDD, or whether it merely reflected the presence of autistic symptoms.

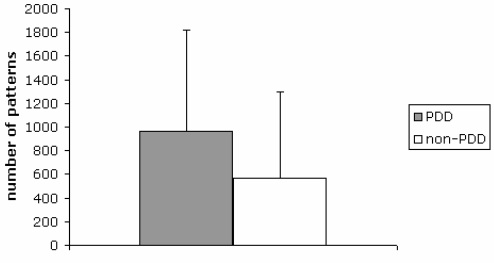

Figure 2. *Number of patterns (mean+SD) in PDD and non-PDD children.*

Comparison between groups

Analysis by Theme showed that the behavior of PDD children had more temporal patterns than that of age-matched children who did not have a PDD (Figure 2). From the patterns detected, dyadic patterns were selected (patterns in which both the child and the parent are present as actor). A relatively low percentage of long dyadic patterns were found for dyads with children with a D-classification compared

to dyads with age-matched children without a D-classification (Figure 3). This low percentage of long dyadic patterns was found both within the subgroup of D-children with a PDD and within the subgroup of children without a PDD.

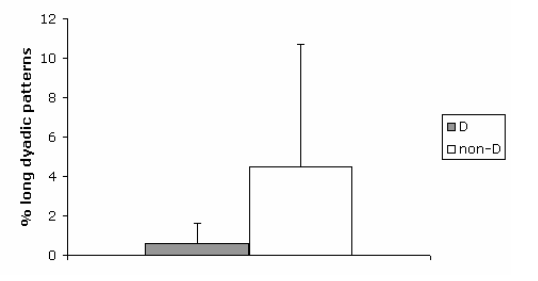

Figure 3. *Percentage of long dyadic patterns (mean+SD) in children with a D-classification and children without a D-classification.*

Children with a PDD were not given a D-classification more often than age-matched non-PDD children. Three out of 19 (16.7%) children with a PDD and 2 out of 19 (10.5%) normally developing children were classified as 'D'.

Conclusion

The authors suggest that the large number of patterns found in the children with a PDD reflect their ritualistic/stereotyped way of interacting with the environment. The low number of long dyadic patterns in children with a D-classification may result from their disorganized social behavior.

The finding that a D-classification did not occur more often in children with a PDD than in non-PDD children means that a disorganized/ disoriented attachment is no indication of a Pervasive Developmental Disorder.

Reference

Willemsen-Swinkels S.H.N.; Bakermans-Kranenburg M.J.; van IJzendoorn M.H.; Buitelaar J.K.; van Engeland H. (2000) Insecure and disorganised attachment in children with a pervasive developmental disorder: Relationship with social interaction and heart rate. *Journal of Child Psychology and Psychiatry*, **41**, 759-767.

Theme: a unique tool!

The present example is one of numerous possible applications of Theme in behavioral research. The study highlights Theme as a unique tool to detect and analyze 'hidden' patterns. Patterns of this kind are hard or impossible to detect using other methods.

How does Theme work?

Theme uses a unique algorithm that searches for relationships between events by taking into account both the order and relative timing of these events, and their hierarchical structure. Statistics such as the number of different patterns detected in a behavioral record, their length, abundance and number of actors involved can be used as objective measures of the level of organization or complexity of the behavior.

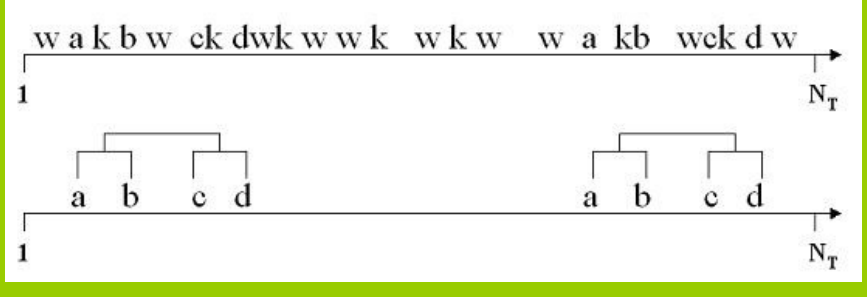

Figure 4. *Upper part: A record containing six types of events (a, b, c, d, k and w). Lower part: The same record after removing all occurrences of k and w. Two simple pattern (ab) and (cd) appear that were difficult to find when the other events were present. The patterns (ab) and (cd) are part of a larger pattern ((ab)(cd)) which may then become part of an even more complex pattern.*

Reference

Magnusson MS (2000), Discovering hidden time patterns in behavior: T-patterns and their detection. *Behavior, Research Methods, Instruments & Computers* **32**, 93-110.