

Decreasing Aggressive and Non-compliant Behaviors of Students with Autism Through the Use of an “Elapsation of Time” Stimulus

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The researcher suggests that a possible reason for students with autism engaging in escape-maintained behaviors in inclusion settings is that there is no clear stimulus signaling the length of time until reinforcement. The researcher investigated whether a correlation exists between the use of a time stimulus and a decrease in aggressive and non-compliant behaviors of two students with autism. The time stimulus created by the experimenter was designed to show time elapsing over minutes through the use of two, colored, semi-circular disks. The discs were able to spin freely within a larger white disc that was labeled from 1 to 30 minutes. A green disc was set to a particular time and the students were taught that when the red disc covered the green, they were given access to the reinforcer. The results indicate that the time stimulus was associated with a reduction in aggressive and non-compliant behaviors. Possible explanations for the effectiveness of this device as well as improvements for future research are discussed.

Some children with autism, when placed in settings in which they are included with typical peers, and have difficult demands placed on them, may engage in a variety of “inappropriate” behaviors (i.e. aggression and non-compliance). The function of these behaviors may be escape-maintained. There have been several studies citing instances in which aggressive behaviors are exhibited in demand situations and maintained by escape (Asmus, Wacker, Harding, Berg, Derby, & Kocis, 1999; Lalli, Vollmer, Progar, Wright, Borrero, Daniel, Barthold, Tocco, & May, 1999; Progar, North, Bruce, DiNovi, Nau, Eberman, Bailey, & Nussbaum, 2001).

Wait times can be a triggering event for inappropriate behaviors (Rolider & Axelrod, 2000). The researcher asserts that wait times for the delivery of reinforcers can be a trigger for aggressive and non-compliant behaviors because there may be no clear stimulus signaling the time until delivery of a reinforcer (i.e., a break). It may be that children with time-telling skills can “bridge the gap” until the delivery of reinforcement. Most typical children are able to use a clock or watch to see “how much longer” they are required to engage in a particular task. Due to the pervasive deficits present in most children with autism, the use of a standard clock can be an overwhelming task. Therefore, students with autism are provided with no clear stimulus signaling time until reinforcement and thus engaging in aggressive or non-compliant behaviors may be maintained by escape.

There has been very little research documenting effective alternative ways to “conceptually” teach time-telling skills to students with autism. One approach (Creekmore, Peters, Maxwell, Hunt-Lewis, Smith, & White-Roberts, 1985) proposes a switch in the method of instruction from the use of the analog clock to the digital clock. It cites the complexity of the analog clock in that it contains numerals that have no utility for the students unless they are the ones to which the hour and minute hands point specifically. Yet it notes how the digital clock contains only those numerals required to determine the exact time (Creekmore et al., 1985).

Creekmore et al.’s approach pairs the numerals that appear on the face of the digital clock with specific activities that take place within the student’s day in a mural format (i.e. the face of the digital clock may read 11:45 and be placed next to a picture of a student eating lunch). At specific times students are directed by the teacher to verbally read the time and label the corresponding activity that coincides with that time. This occurs throughout the day. Eventually the murals are removed and time-telling skills are generalized (Creekmore et al., 1985).

Jan Rogers, a parent, inadvertently developed a device named the “Time Timer.” In an attempt to teach her non-handicapped 4-year-old daughter “how much time is left,” she developed a stimulus that presents a visual depiction of elapsed time. The Time Timer is a white clock face with the numbers printed counter-clockwise in minutes starting at 55 and ending at 0. A red disc can then be set at any particular number of minutes up to an hour. The red disc moves in a counter-clockwise fashion until it entirely “disappears” behind a slit at the zero point. Essentially, once the red is gone, the time has elapsed (Generaction, Inc. brochure).

Independent of Ms. Rogers work, the researcher developed a stimulus that shows time elapsing over minutes. Until now, no research has been conducted correlating the use of a stimulus which shows time elapsing over minutes with a reduction of aggressive and non-compliant behaviors of children with autism; the experimenter hypothesizes that such a stimulus would be associated with a decrease in the likelihood of these behaviors.

Method

PARTICIPANTS

The participants were two boys diagnosed with autism: “Thomas” was a 10-year-old Caucasian; “Junior” was a 7-year-old Jamaican-American. Thomas and Junior both exhibited aggressive and non-compliant behaviors; based upon functional assessments conducted earlier in the childrens’ school careers, their behaviors were determined to be escape-maintained. Both students possessed moderate vocal capability and each were provided with a full-time behavior therapist.

MATERIALS

The time stimulus used for this experiment is described as follows. A white circular disc (approximately 6 inches in diameter) with a semicircle cut-out of the right half was labeled from 1 minute to 30 minutes along the outside of the semicircle. A solid white disc served as the back of the device. Between the two white discs were two semicircles, one red and one green, which were able to spin freely. On the left half of the front of the disc was written “I am waiting for:” followed by a blank line. All components of the device were laminated (See Appendix A).

Observations

Aggression was defined as any attempt or success by the child to hit, kick, pinch, scratch, bite, or head butt himself, an object (over 5 seconds), or another person. Non-compliance was defined as any response by the child in opposition to the therapist’s/ counselor’s direction or responding with a “no.”

Five-minute-interval data sheets were used to record the occurrence/ non-occurrence of the target behaviors. The child’s behavior therapist was responsible for data collection. If aggression or non-compliance occurred within a particular interval, a plus was recorded in that column; if none of the target behaviors occurred within that interval, a minus was scored. The time intervals started at 9:00 am and ended at 3:30 pm (See Appendix B). The daily percentage of aggression and non-compliance was calculated by dividing the number of occurrences by the total number of intervals scored that day.

Inter-observer reliability was informally evaluated by the researcher. The researcher periodically questioned therapists, as behaviors occurred, as to whether they would score the behavior as an occurrence or non-occurrence. Also, if large discrepancies existed between therapists’ data, the researcher would review the therapists’ data collection procedures and discard any inaccurate data. Also, operational definitions of aggression and non-compliance were typed at the bottom of all data collection sheets to help ensure consistency between therapists’ scoring.

PROCEDURE

The procedure used an ABA reversal design. Both students were initially tested for fluency with the time stimulus. The researcher asked the students to “point to ___ minutes.” Both students met criteria for fluency with 100% accuracy and responding within three seconds to the S^D. Each child practiced the time stimulus 3 times per day, in situations in which no demands were placed, at a maximum delay of reinforcement of 5 minutes (*See Appendix C*).

In Baseline₁ of the experiment, both participants utilized a token economy system of reinforcement in which stars were drawn on a grid. Stars were given for appropriate behavior (i.e. following directions, participating in group activities, not engaging in aggressive or non-compliant behaviors). Stars were cashed-in for a variety of reinforcers such as edibles, breaks, or access to preferred toys. The number of stars required to gain access to the reinforcer varied between 6 and 20.

In the second phase, the Time Stimulus was implemented; the time until reinforcement was started at 5 minutes. Every new activity that the child was scheduled to be included with his peers, on a particular day, was an opportunity for the time to be increased by 1 minute. Typically new activities began every 45 minutes. If no non-compliant or aggressive behaviors were occasioned during that interval, the time was increased. If non-compliance or aggression occurred, the time would be repeated at the next new activity. The times set between each activity (i.e., the time before a new activity started but after criteria had been met for the previous time) were varied at the therapist’s discretion, but the time was always less than the previous criteria.

In Baseline₂, the experimenter returned to baseline conditions; the use of the time stimulus was discontinued and the token-economy was again used.

Results

The aggressive behaviors exhibited by Thomas during Baseline₁ ranged from 0 to 8.2 percent and fluctuated on a daily basis (See Figure 1). Following the implementation of the Time Stimulus, there was an immediate drop to 0 percent aggression and the behavior remained at zero for 7 consecutive dates. Toward the end of the phase, the occurrence of the behavior eventually increased to 4.9 percent. In Baseline₂, the percentage of aggression sharply increases to 10.7 and then fluctuated on a daily basis ending at 6 percent. The mean percentages of aggression for Baseline₁, Time Stimulus, and Baseline₂ were 3.92, .857, and 3.2 respectively.

Similar to Thomas’ percentage of aggression recorded in Baseline₁, Junior’s percentage of aggression fluctuated a great deal with a range of 0 to 16.7 (See Figure 2). Following the implementation of the time stimulus, there was a minor increase in the percentage of aggression to 2.9. Aggression then dropped to 0 percent for 6 consecutive dates. The percentage of aggression slowly increased at the end of the Time Stimulus condition to 3.7. The percentage of aggression again increased in Baseline₂ during the return to baseline. The mean percentages of aggression for Baseline₁, Time Stimulus, and Baseline₂ were 2.74, 1.26, and 7.4 respectively.

Thomas’ and Junior’s percentages of non-compliance followed extremely similar patterns during the intervention phase. During Baseline₁, Thomas’ percentages of non-compliance fluctuated with a range of 0 to 16.1 (See Figure 3). Junior’s percentages also fluctuated with a range of 0 to 26.9 (See Figure 4). Both graphs show an immediate decrease in the percentage of non-compliance with the percentages of the behavior remaining at 0 for both participants for the following six consecutive dates. Graphs for both participants display an increase in percentages of non-compliance in the final three data points within the intervention phase, with both Thomas and Junior exceeding 13 percent (See Figures 3 and 4). Following the intervention phase, Thomas’ percentages showed an initial decrease and then again began to fluctuate. Junior’s percentages of non-compliance showed an increase in the percentages of non-compliance for all

dates in the return to baseline phase. The mean percentages of aggression for Thomas in phases 1, 2, and 3 were 7, 3.36, and 4.8 respectively. The mean percentages of aggression for Junior for phases 1, 2, and 3 were 5.84, 3.81, and 15.9 respectively.

Discussion

The results support the researcher's hypothesis. The use of the elapsation of time stimulus was associated with a reduction in both aggressive and non-compliant behaviors of two students with autism.

As was previously stated, no research has been conducted correlating the use of a time stimulus with a reduction of aggressive or non-compliant behaviors of students with autism. The researcher asserts that the reason for the effectiveness of this device is largely stimulus control. Catania (1998) defines [stimulus] control as "the systematic modification or maintenance of behavior by changes in relevant conditions (Catania, 1998, p. 384)." For example, when driving in a car and coming to a stop at a red light, it could be argued that the behavior of applying the brakes was under stimulus control, the stimulus being the red light. Similarly in the present study, the time stimulus provided a clear stimulus which signaled the time until reinforcement. When the "red covered the green," access was given to the reinforcer.

In addition to stimulus control, the consistency in which the reinforcement was delivered may have contributed to the device's effectiveness. Typically with use of systems such as token economies, reinforcement is delivered for appropriate behaviors, but delivery also depends largely upon when the therapist reinforces the students' behaviors. By using the time stimulus, students are consistently able to monitor time elapsing as well as obtain access to the reinforcer when the time has expired.

The researcher does acknowledge one concern with the study. It was apparent that the percentages of aggression and non-compliance increased toward the end of the intervention phases for both students. The researcher suggests that the shaping procedure, utilized in increasing the time-delay until reinforcement, may have been carried-out too quickly. The researcher suggests a slower shaping procedure in which criteria (the student engaging in no aggressive or non-compliant behaviors during the time that the stimulus is set for, prior to access to the reinforcer) is met at least three times before increasing the delay of reinforcement. The researcher suggests further study of the elapsation of time stimulus.

References

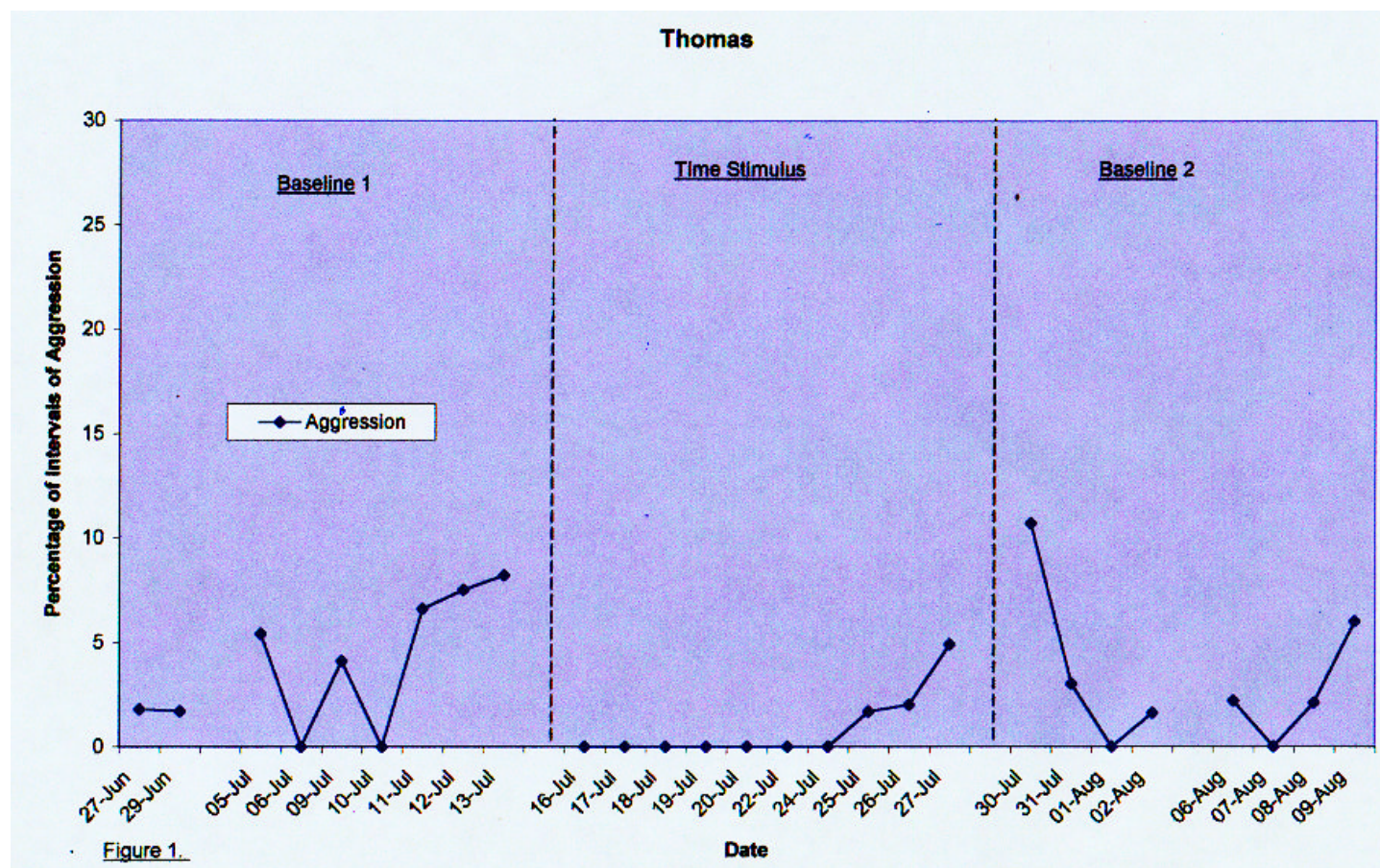
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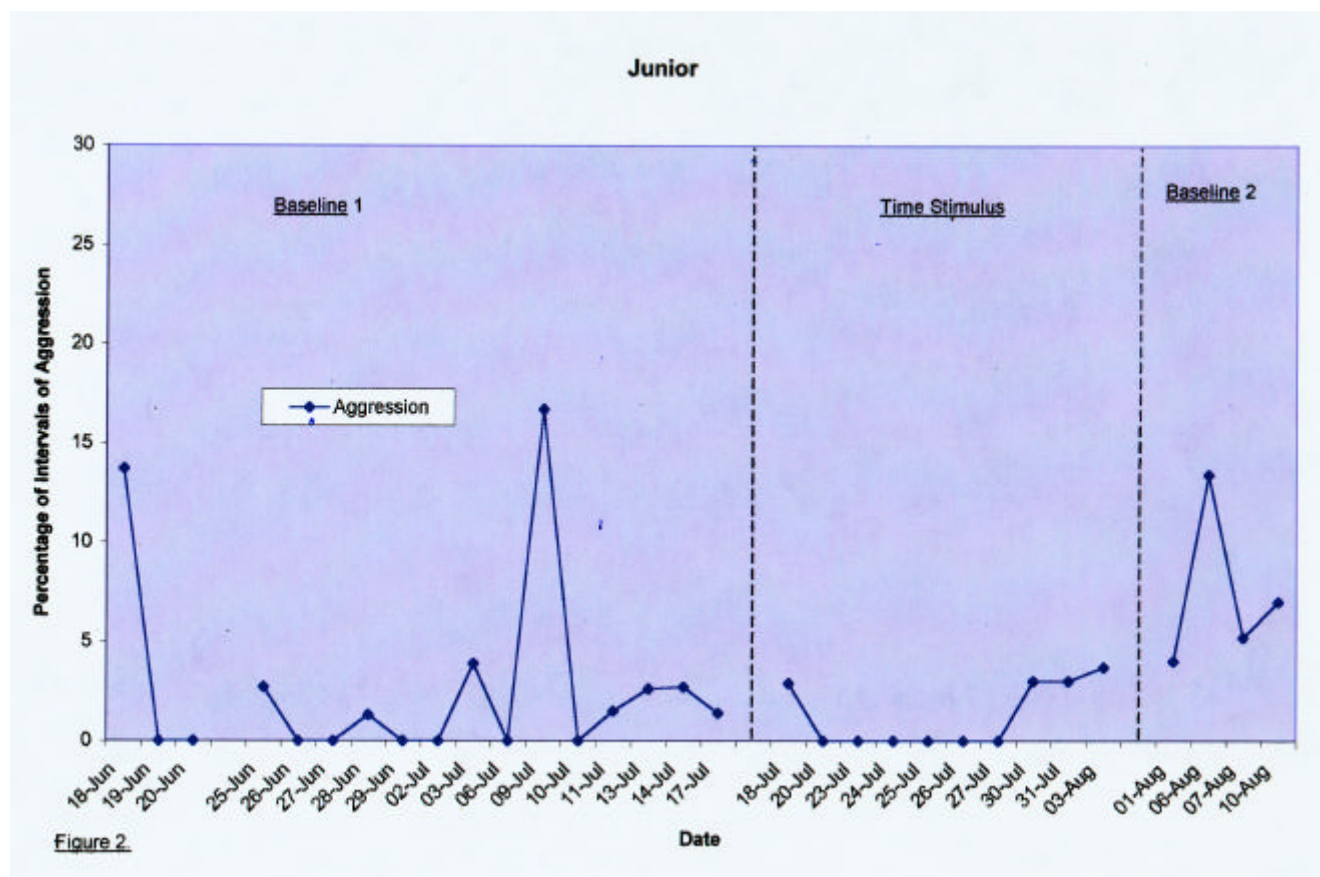
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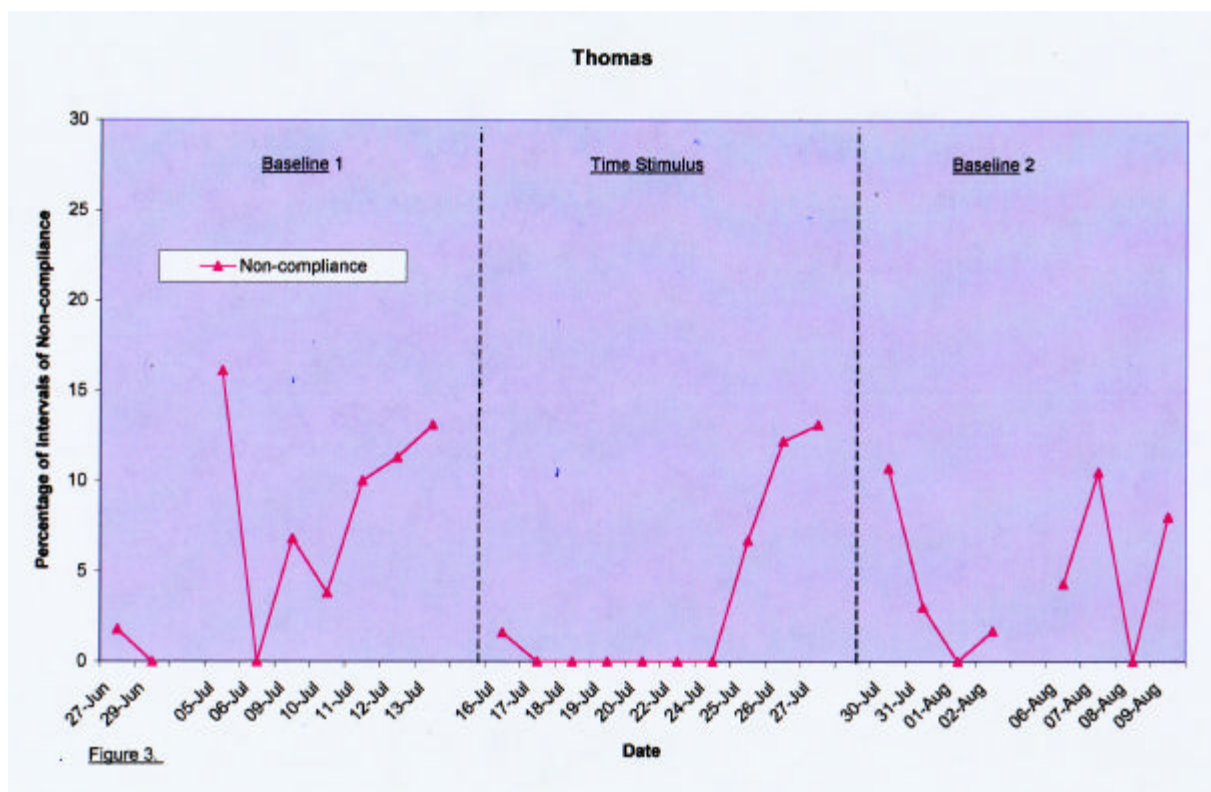
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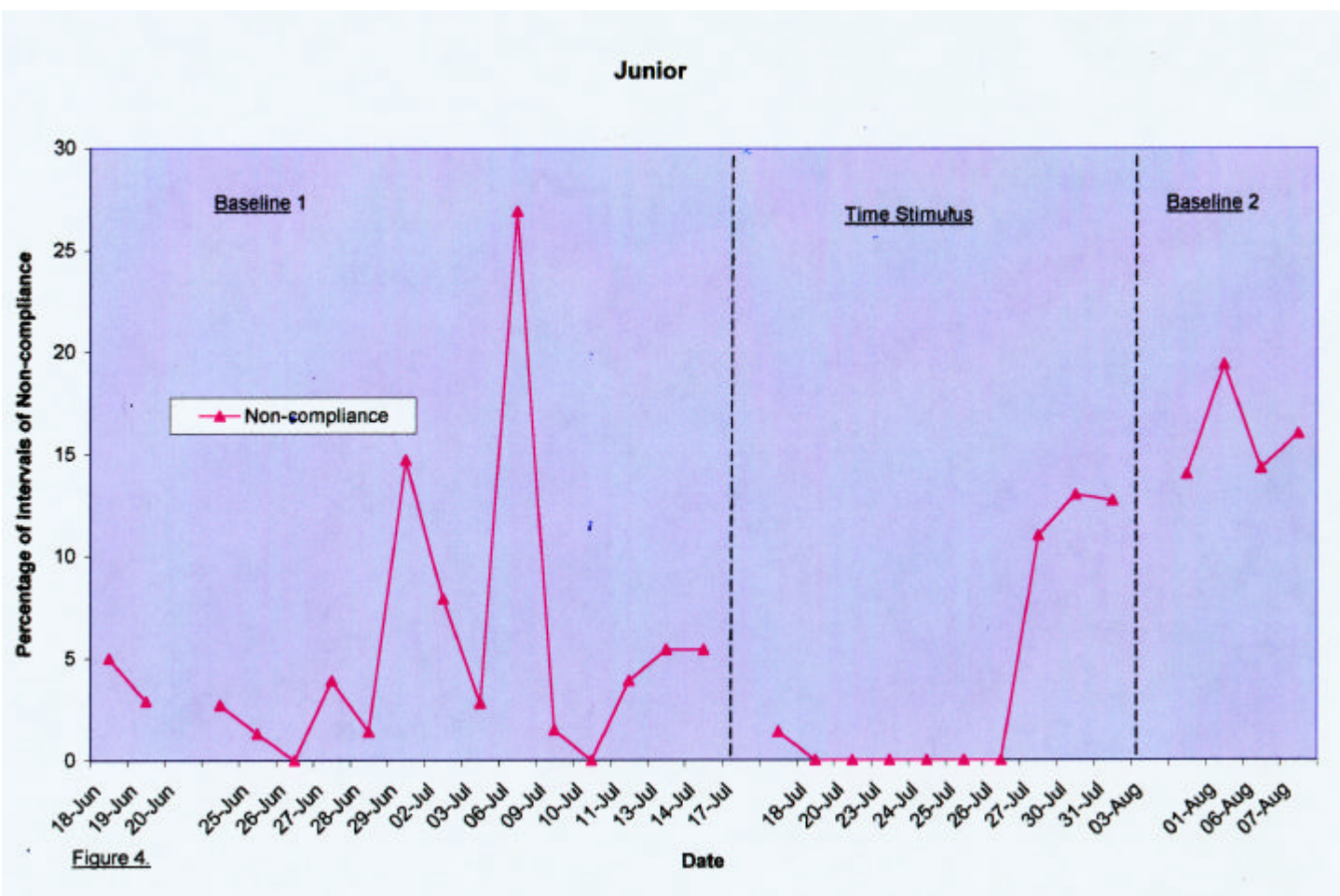
Percentage of Interval Aggression for Thomas in Baseline₁, Time Stimulus, and Baseline₂.



Percentage of Interval Aggression for Junior in Baseline₁, Time Stimulus, and Baseline₂.



Percentage of Interval Non-compliance for Thomas in Baseline₁, Time Stimulus, and Baseline₂.



Percentage of Interval Non-compliance for Junior in Baseline₁, Time Stimulus, and Baseline₂.