

INTRODUCTION

Persisting deficits in conversational skills are a contributing factor to poor psychosocial adjustment and social isolation following closed-head injury (CHI). Therefore, conversational discourse may be more clinically relevant for the CHI population in terms of long-term outcomes than other genres of discourse. (Bond & Godfrey, 1997; Coelho, Youse, & Le, 2002; Marsh, 1999; Snow & Douglas, 1999). Effective communication skills require the integrity of a number of cognitive abilities that are frequently disrupted following CHI (McDonald, Togher, & Code, 1999). Chronic cognitive deficits contribute to long-term dysfunction and have also been correlated with poor outcome in individuals with CHI (Sohlberg & Mateer, 2001). However, there is a paucity of empirical information regarding the role that underlying cognitive abilities may play in the conversational discourse deficits observed in individuals with CHI. Although treatment studies have suggested that training of specific skills does not generalize to functional activities (Cicerone et al, 2000; Palmese & Raskin, 2000; Park et al., 1999), no treatment study to date has utilized performance on a functional communicative task, such as conversational discourse, as an outcome measure. The present study investigated whether improvements in a specific cognitive ability, attention, would facilitate conversational discourse for two individuals with CHI. Two treatment programs were investigated, one attention-based and one social-skills based. It was hypothesized that attention training would provide greater benefit by improving attention as well as conversational discourse while social skills training would improve only conversation.

METHOD

Participants

Two individuals who had sustained a closed head injury (CHI) were recruited from area hospitals and support groups to participate in this study. Each of the participants was previously diagnosed with a CHI by neurological report based on imaging studies and met rigid inclusion criteria based on language and cognitive test scores. In addition, each participant demonstrated deficits in two or more of the four types of attention tested by the Attention Process Training Test (Sohlberg, Johnson, Paule, Raskin, & Mateer, 1994). Participants also had deficits in conversational discourse subjectively described by clinical staff or family members as interfering in meaningful communication. Participant characteristics are presented in Table 1.

Treatment measures

The following tests served as pre- and post- treatment measures of attention: a) *Attention Questionnaire* (Sohlberg et al., 1994) which allowed the participant to rate the frequency of occurrence for different attentional problems; b) *Attention Process Training Test (APT-Test)* (Sohlberg et al., 1994) which provided a screening measure of attentional skills based on the theoretical framework of the APT-II program; c) *Test of Everyday Attention (TEA)* (Robertson, Ward, Ridgeway, & Nimmo-Smith, 1996) which tested attention via the use of tasks that closely approximate commonly occurring activities; d) *Auditory Verbal Memory Task (AVMT)* (Tompkins, Bloise, Timko, & Baumgaertner, 1994) a measure of complex working memory; and e) *Wechsler Memory Scale Revised (WMS-III)* (Wechsler, 1997) *digit span*, which measured short term and working memory, *logical memory*, which measured short term memory and long

term storage and retrieval, and *paired associates*, which measured long term storage and retrieval and new learning.

During baseline sessions and weekly treatment probes, all participants engaged in 10-minute conversations with the examiner and a family member, friend, or stranger. Each conversation was audiotaped and later transcribed verbatim with each utterance being assigned to one of the speakers. Conversations were analyzed for response appropriateness (Table 2).

Treatment Conditions

Table 3 illustrates the sequence of treatment conditions. A single subject A-B-A-C-A multiple treatments comparison design (McReynolds & Kearns, 1983) was utilized to evaluate the effects of two treatment programs, the Attention Process Training Program II (APT-II) (Sohlberg et al., 1994) and Interpersonal Process Recall (IPR) (Helffenstein & Wechsler, 1992) on conversational performance.

IPR (Helffenstein & Wechsler, 1992) suggests that if an individual is videotaped during an interpersonal interaction and is then shown the videotape immediately following, he or she is better able to recall his or her feelings in greater detail. This approach provides the individual with the opportunity to verbalize insights related to the underlying dynamics of the interaction.

The APT-II (Sohlberg et al., 1994) consists of hierarchically organized tasks designed to simultaneously rehabilitate both attentional processes as well as speed of cognitive processing (Palmese & Raskin, 2000). The tasks involved the use, manipulation, and repetition of auditory and visual stimuli focusing on each of the components of attention: sustained, selective, alternating, and divided attention.

Data analysis

Treatment data were graphed and visually inspected for treatment effects and generalization. For each participant, treatment effect sizes were calculated using the *f* statistic (Kromrey & Foster-Johnson, 1996). The *f* statistic is an index of the magnitude of change in performance from pre- to post-treatment, in this case from baseline to treatment and maintenance conditions for each treatment paradigm. The effect of the first treatment introduced in the treatment sequence was compared to the effect of the combination of the two treatments on conversational discourse.

Reliability

Ten percent of the discourse samples were reanalyzed for interjudge and intrajudge reliability. Interjudge reliability ranged from 80% to 95%. Intrajudge reliability ranged from 85% to 95%.

RESULTS

The results will be discussed for each participant in terms of the conversational measures Comments and Adequate Plus. Each measure will be described for the two dyads sampled, participant with examiner and participant with friend, family member, or stranger. None of the participants produced many Obliges nor Adequate Responses; consequently, these two measures were not included in the data analysis. In addition, attention and memory test scores will be summarized.

Participant 1 - D.H.

The treatment sequence for DH was the IPR followed by the APT-II. Treatment probe data are shown in Figures 1 to 4, treatment effect sizes are shown in Table 4. Overall, DH's results from the treatment probes, Attention Questionnaire (Sohlberg et al., 1994), and pre- and post- testing suggested only minimal change from baselines, thus only partially supporting the research hypotheses. Although these results suggested little functional change in attention ability and conversational skills relative to baseline levels, the examiner, DH, and her family observed a variety of qualitative changes.

Participant 2 - L.P.

The treatment sequence for LP was the APT-II followed by the IPR. LP returned for four-week follow-up; however, the data from these conversations were not able to be included due to technical difficulties with the audiotapes. Treatment probe data are shown in Figures 5 to 8, treatment effect sizes are shown in Table 5. Results from the treatment probes, Attention Questionnaire (Sohlberg et al., 1994), and pre- and post- treatment testing did not support the research hypotheses. Minimal change was noted for conversational and testing measures; therefore, neither treatment regimen appeared to facilitate meaningful change in attention ability or conversational skills relative to baseline levels.

DISCUSSION

Treatment effect sizes suggest that both treatments were active; however, performances of the two participants were variable throughout the study reducing the magnitude of change observed. The results of this study suggest that a variety of factors may influence conversational discourse. Regardless of the treatment introduced, indices of conversational performance should be specifically selected for each individual treated. Conversational performance measures selected from group data may not be sensitive indicators of change for all individuals. It is unclear at this time if the APT-II, the IPR, or the combination of both treatments is the most effective approach to treating conversational discourse deficits in this population. Such equivocal results are not often reported but are equally important in eliminating subject selection bias and offer support for patient-specific clinical decision-making (Ylvisaker et al., 2002). Implications for clinical practice and future research will be discussed.

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Table 1. Participant characteristics at time of participation in this study.

	Participant 1: DH	Participant 2: LP
Age	47	25
Gender	Female	Male
Time Post-Onset	29 months	8 years
Injury	Motor vehicle accident	Fall from fifth story window
Site of Lesion	Left basilar skull fracture, a left frontal subdural hematoma, and multiple brain contusions	Right frontal epidural hematoma, interventricular hematoma, bilateral temporal lobe contusions with subarachnoid hematomas
Length of Treatment	9 weeks inpatient	22 weeks inpatient, 16 weeks homecare, 39 months outpatient
Education	Associates degree and vocational training	High school degree
Occupation Prior to Injury	Project manager for a large corporation (23 years)	High school student
Occupation Following Injury	Unable to return to work	Shelving books at community library one hour a day with supervision
Living Situation	Living at home with her husband and two teenage children	Living in modified apartment attached to his parents' home; 24-hour supervision
WAB A.Q.	99.3	94.6
GOAT	99	94
DRS	144	124
RLA	X (purposeful and appropriate)	VII (automatic and appropriate)

Note: WAB A.Q.= Western Aphasia Battery Aphasia Quotient (Kertez, 1982); GOAT = Galveston Orientation and Amnesia Test (Levin, O'Donnell, & Grossman, 1979); DRS = Dementia Rating Scale (Mattis, 1976); RLA = Ranchos Los Amigos Level of Cognitive Functioning (Hagen 1998)

Table 2. Measures used to analyze conversations (Blank & Franklin, 1980; Coelho, Liles, & Duffy, 1991; Coelho, Youse, & Le, 2002).

Category	Measure	Definition	Example
Appropriateness: Speaker Initiations	Obliges	Utterances containing explicit requirements for a response.	“Where do you live?”
	Comments	Utterances not containing an explicit demand for a response.	“It’s a nice place to work.”
Appropriateness: Speaker Responses	Adequate	Utterances that appropriately met the initiator’s verbalization.	In response to the question, “What time is it?” the response might be “It’s three o’clock.”
	Adequate Plus	Utterances that are relevant and elaborate on the theme, providing more information than was requested.	In response to the question “What time is it?” the response might be, “It’s three o’clock. I know that because I just passed the new clock at the Dime Savings Bank.”
	Inadequate	Utterances in which the information offered is invalid, irrelevant, or insufficient to meet the constraints established by the initiator’s utterance.	In response to the question, “What time is it?” the response might be, “I’m 37 years old.”

Table 3. A-B-A-C-A Treatment Design.

	A	B	A	C	A	
Condition	Baselines	First Treatment	Post - Treatment 1 Baselines	Second Treatment	Post-Treatment 2 Baselines	Four-week Follow-up
Length	One week	Six weeks	One week	Six weeks	One week	One week
Duration	3 sessions	*Two or three one hour sessions	3 sessions	*Two or three one hour sessions	3 sessions	3 sessions
Testing	Attention Battery Questionnaire APT-Test TEA AVMT WMSDS WMSLM WMSVPA		Attention Battery Questionnaire APT-Test TEA AVMT WMSDS WMSLM WMSVPA		Attention Battery Questionnaire APT-Test TEA AVMT WMSDS WMSLM WMSVPA	Attention Battery Questionnaire APT-Test TEA AVMT WMSDS WMSLM WMSVPA
Treatment		**Apt-II or IPR		**APT-II or IPR		
Treatment Probes	Four 10-minute conversations. Two with examiner, two with family, friend, or stranger	Weekly 10-minute conversations. One with the examiner, one with family, friend, or stranger	Four 10-minute conversations, Two with examiner, two with family, friend, or stranger	Weekly 10-minute conversations. One with the examiner, one with family, friend, or stranger	Four 10-minute conversations, Two with examiner, two with family, friend, or stranger	Four 10-minute conversations, Two with examiner, two with family, friend, or stranger

* DH was seen for treatment one hour twice a week; LP was seen for treatment one hour three times a week.

** DH received IPR treatment followed by APT-II; LP received APT-II treatment followed by IPR.

Note. Questionnaire = APT Attention Questionnaire; APT-Test = Attention Process Training Test; TEA = Test of Everyday Attention; AVMT = Auditory Verbal Memory Task; WMSDS = Wechsler Memory Scale III Digit Span subtest; WMSLM = Wechsler Memory Scale III Logical Memory subtest; WMSVPA = Wechsler Memory Scale III Verbal Paired Associates subtest; APT-II = Attention Process Training-II; IPR = Interpersonal Process Recall

Table 4. Treatment effect sizes for DH

	Comments		Adequate Plus Responses	
	With Examiner	With Family/Friend	With Examiner	With Family/Friend
Post IPR	.43	.40	.33	1.66
Post IPR & APT-II	.69	.56	.23	.52

Note: Effect sizes < .02 = trivial; .2 = small; .5 = moderate; .8 = large

Table 5. Treatment effect sizes for LP

	Comments		Adequate Plus Responses	
	With Examiner	With Strangers*	With Examiner	With Strangers*
Post APT-II	.75	.05	.36	.27
Post Apt-II & IPR	.53	.38	.47	.24

Note: Effect sizes < .02 = trivial; .2 = small; .5 = moderate; .8 = large

* None of LP's family members were able to attend therapy with him. Therefore, all conversations in this condition were completed with individuals from the university, referred to as strangers.

Figure 1. Treatment probe data for DH's performance on Comments with the examiner for pre-treatment (1-2), IPR Treatment (3-8), post-treatment 1 (9-10), APT-II Treatment (11-16), post-treatment 2 (17-18), and four-week follow-up (19-20).

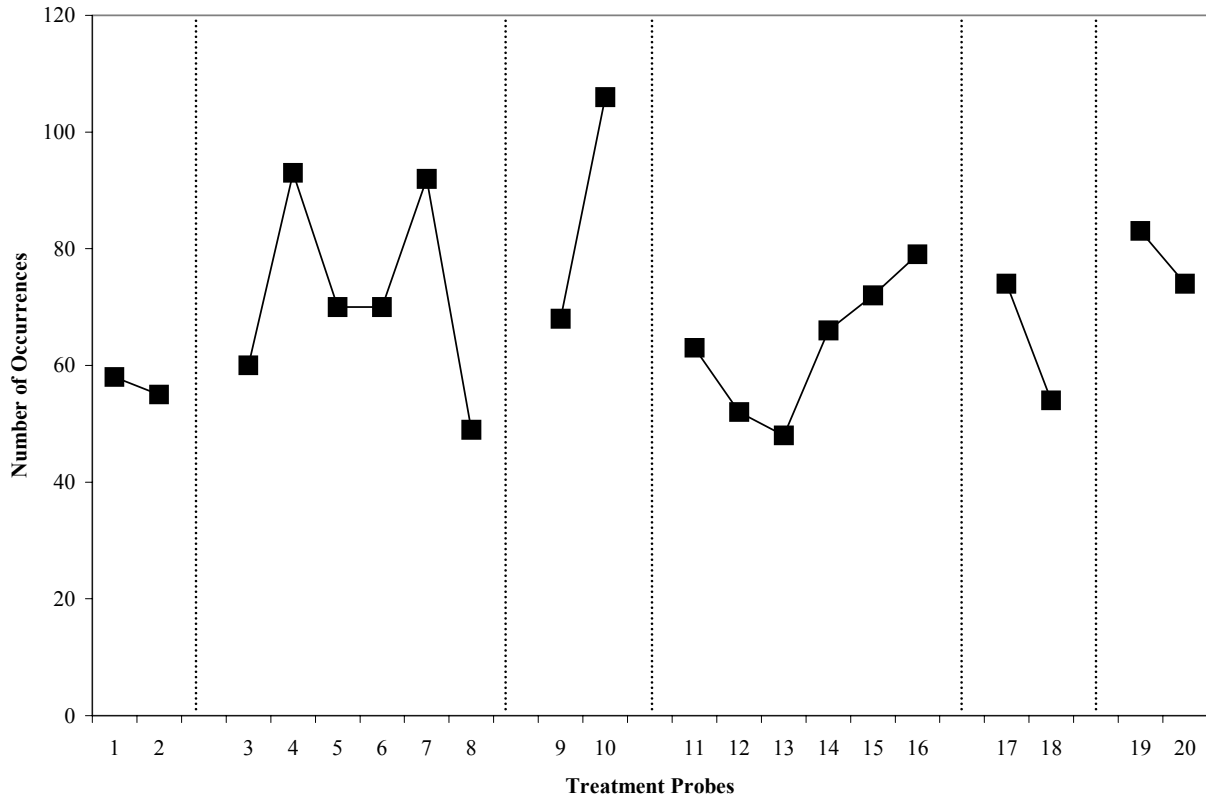


Figure 2. DH's performance on Comments with family and friend for pre-treatment (1), IPR Treatment (2-7), post-treatment 1(8-9), APT-II Treatment (10-15), post-treatment 2 (16-17), and four-week follow-up (18-19).

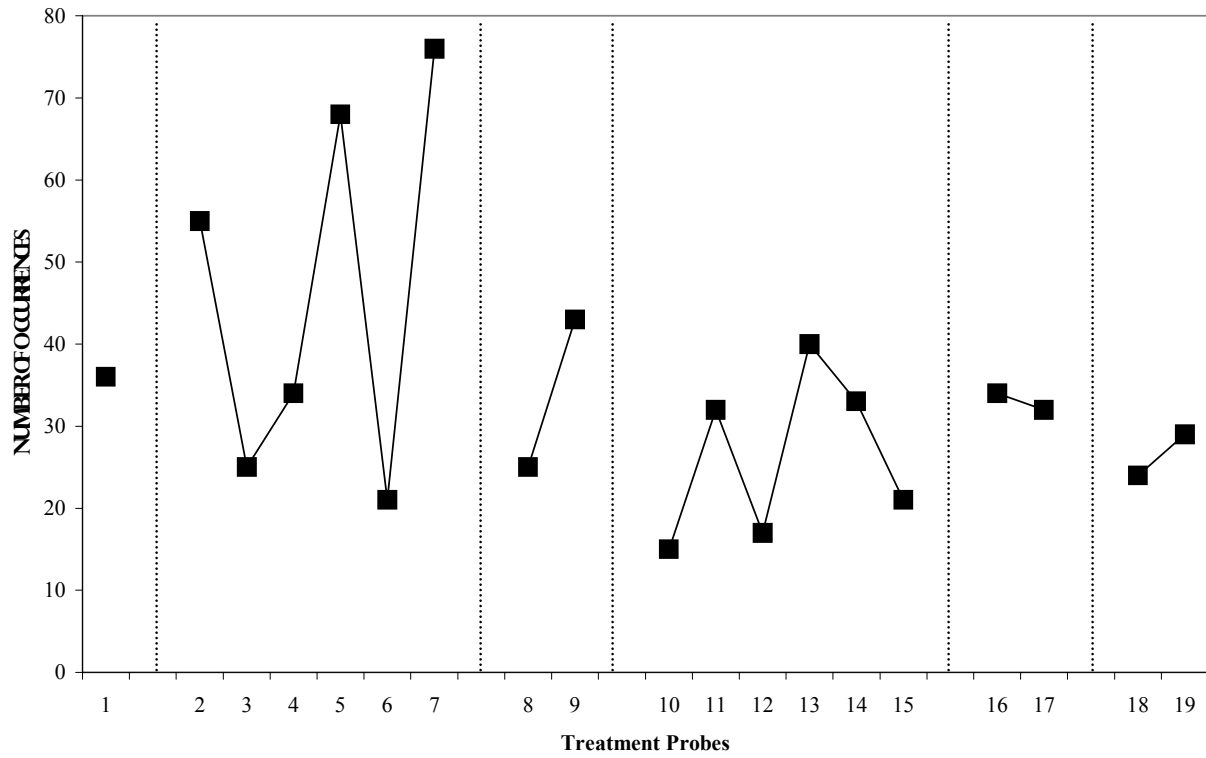


Figure 3. DH's performance on Adequate Plus responses with the examiner for pre-treatment (1-2), IPR Treatment (3-8), post-treatment 1 (9-10), APT-II Treatment (11-16), post-treatment 2 (17-18), and four-week follow-up (19-20).

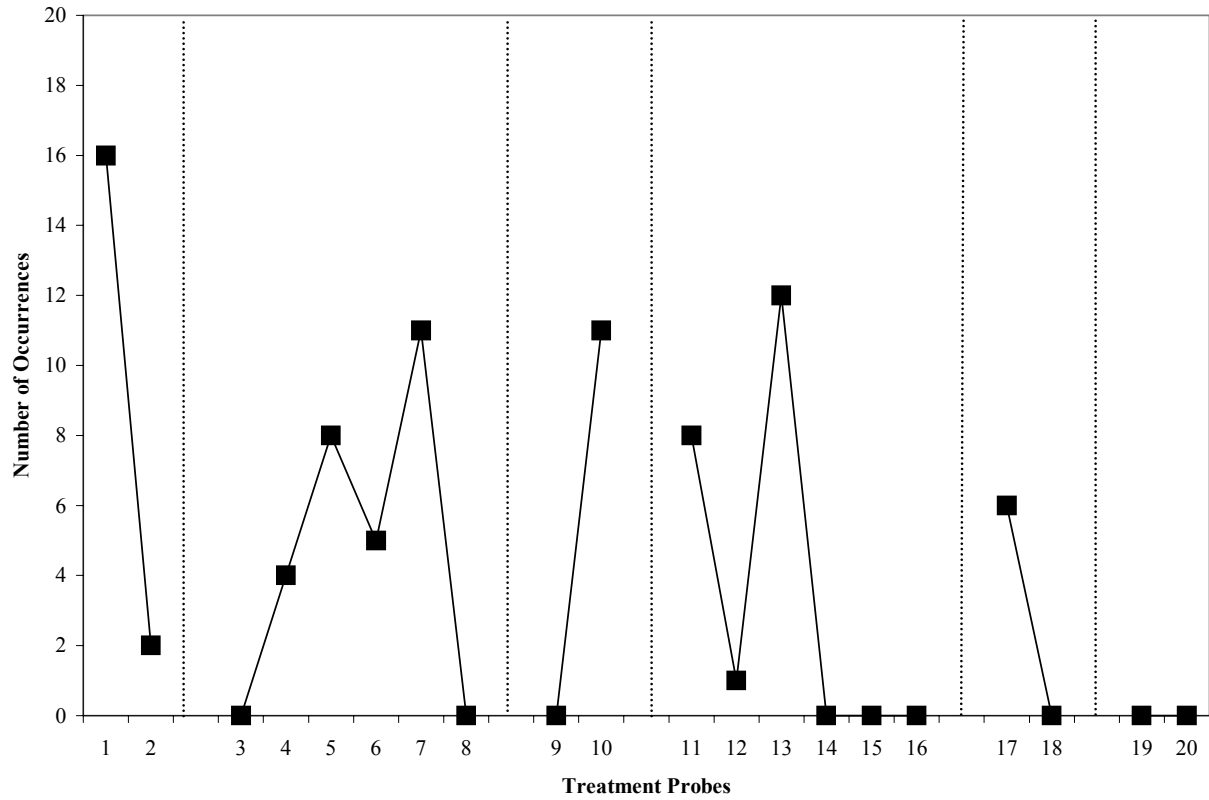


Figure 4. DH's performance on Adequate Plus responses with family and friend for pre-treatment (1), IPR Treatment (2-7), post-treatment 1 (8-9), APT-II Treatment (10-15), post-treatment 2 (16-17), and four-week follow-up (18-19).

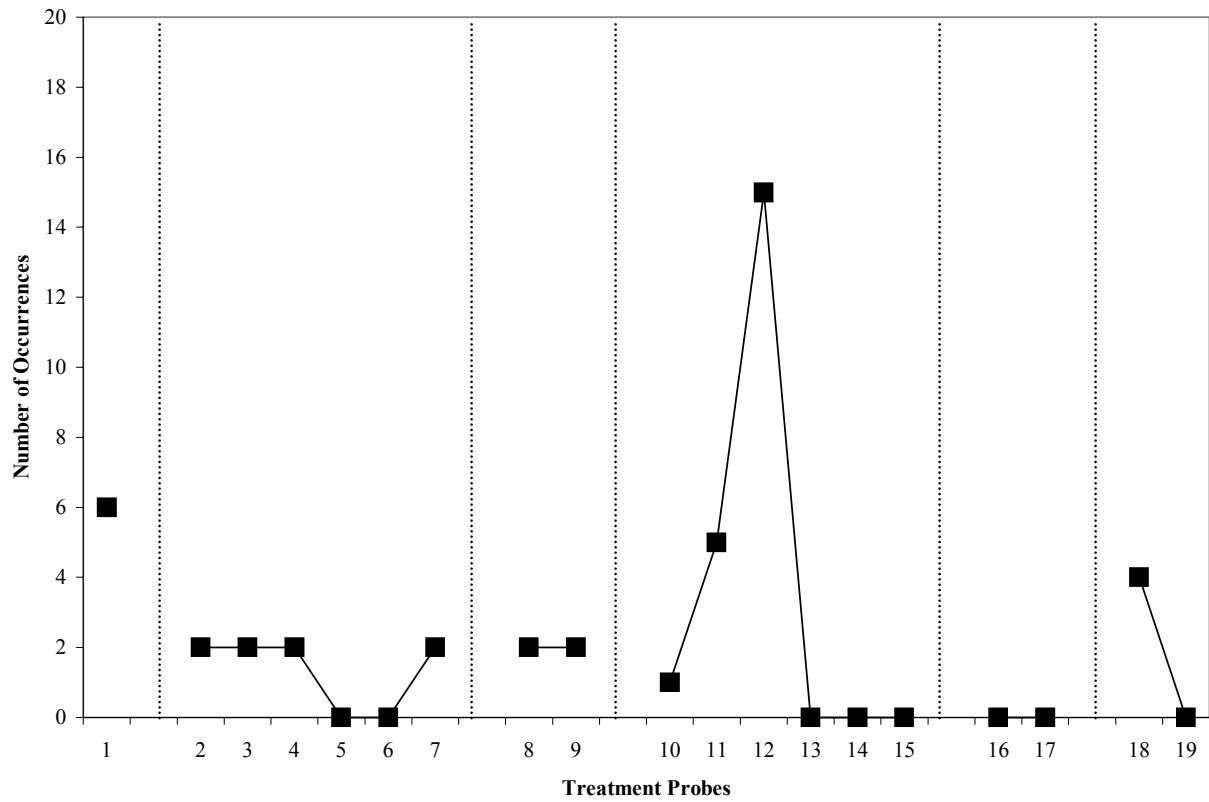


Figure 5. LP's performance on Comments with the examiner for pre-treatment (1-2), APT-II Treatment (3-8), post-treatment 1(9-10), IPR Treatment (11-16), and post-treatment 2 (17-18).

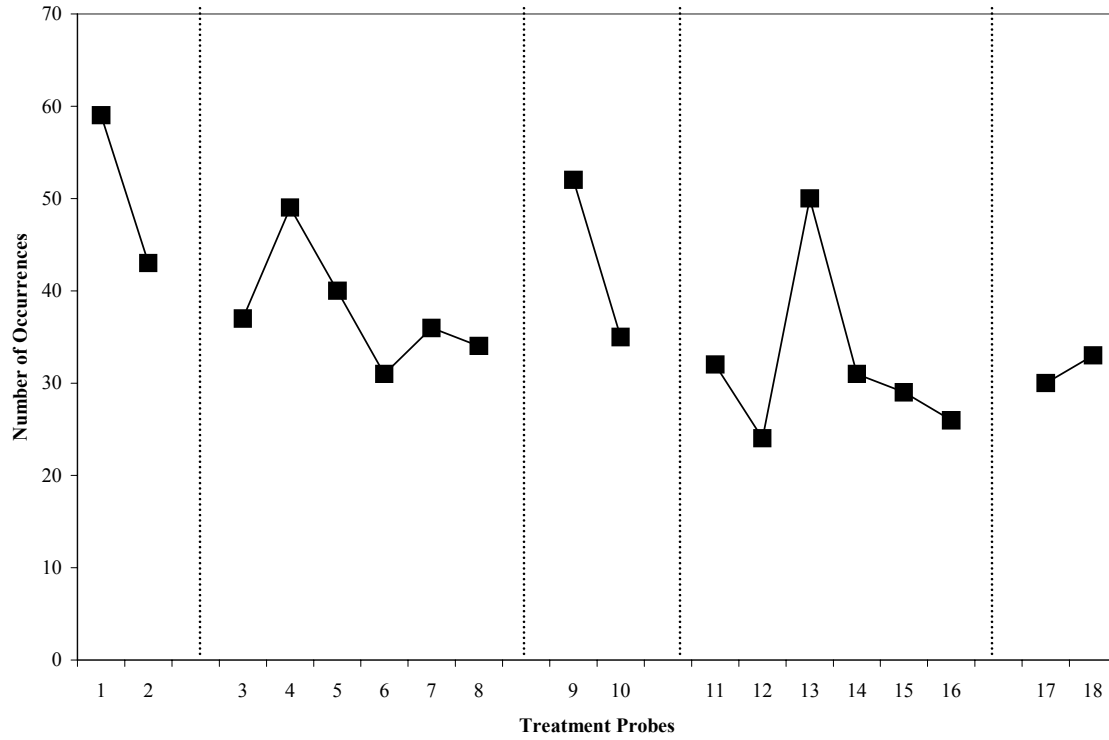
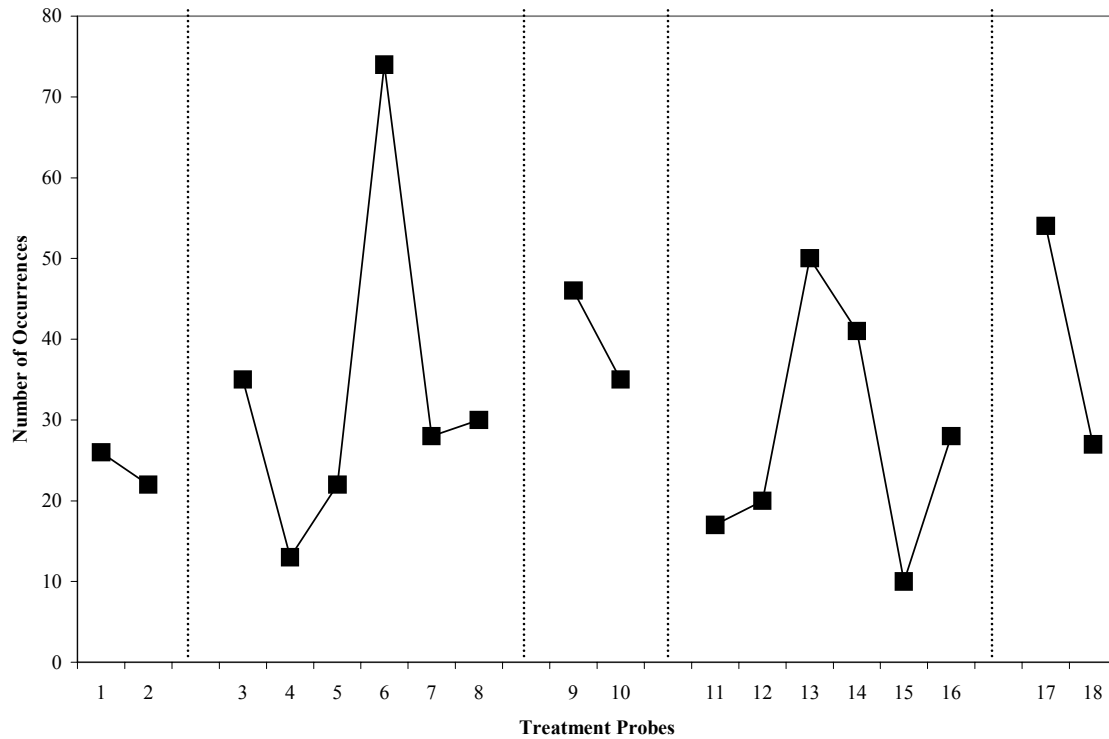


Figure 6. LP's performance on Comments with strangers* for pre-treatment (1-2), APT-II Treatment (3-8), post-treatment 1(9-10), IPR Treatment (11-16), and post-treatment 2 (17-18).



* None of L.P.'s family members were able to attend therapy with him. Therefore, all conversations in this condition were completed with individuals from the university, referred to as strangers.

Figure 7. LP's performance on Adequate Plus Responses with the examiner for pre-treatment (1-2), APT-II Treatment (3-8), post-treatment 1(9-10), IPR Treatment (11-16), and post-treatment 2 (17-18).

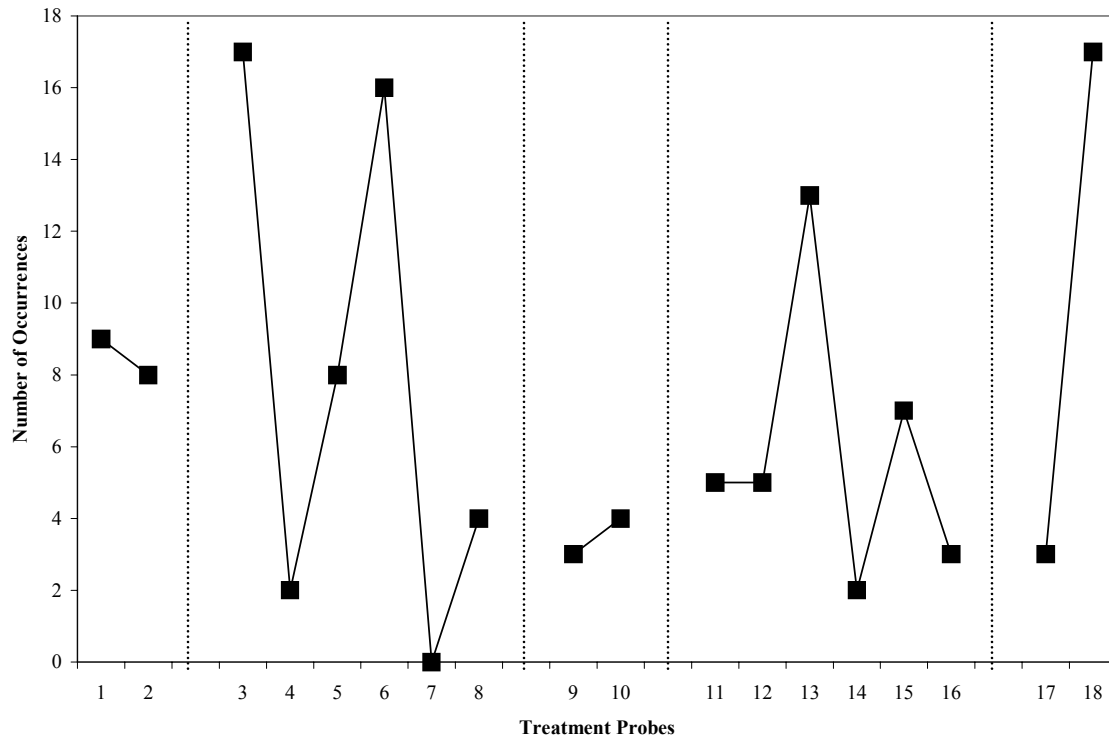
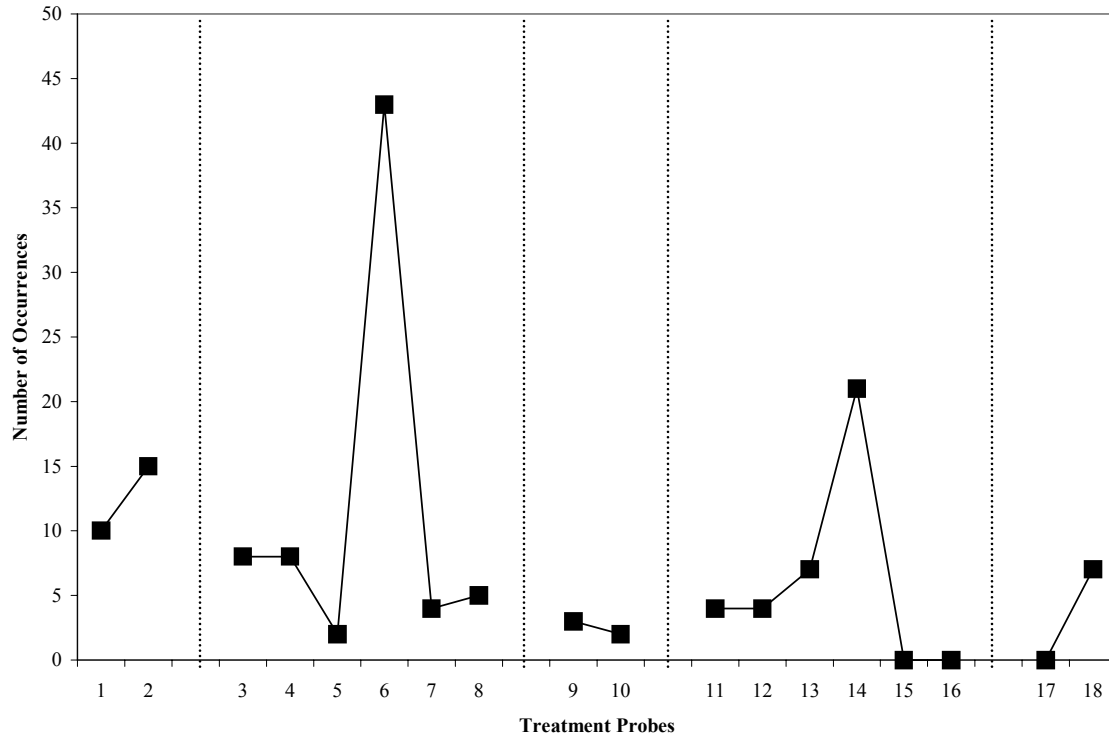


Figure 8. LP's performance on Adequate Plus Responses with strangers* for pre-treatment (1-2), APT-II Treatment (3-8), post-treatment 1(9-10), IPR Treatment (11-16), and post-treatment 2 (17-18).



* None of L.P.'s family members were able to attend therapy with him. Therefore, all conversations in this condition were completed with individuals from the university, referred to as strangers.