Repeated measures in case studies relating social competence and weight loss in two obese adolescents

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In individual behavior therapy two clients were evaluated using behavior categories created by the therapist. Both clients were observed to improve in terms of social competence. One demonstrated a significant inverse correlation between improvement of social competence and weight loss during treatment (16 sessions) and lost weight. The other required longer treatment (40 sessions), but also demonstrated the same tendency of results at the end of intervention. Based on this evaluation, it was postulated that behavior therapy targeted to issues of social competence could be part of treatment for weight loss, and be combined with other therapeutic modalities.
Keywords: Case study, repeated measures, relations among responses, behavior therapy, obesity; social skills; adolescent; social competence.

Obesity has gained more attention due to its high incidence, as well as the difficulties and failures related to its various treatments. Work with obese adolescents is critical, given the likelihood of becoming an obese adult (Jelalian & Saelens, 1999, Neinstein, 1996).

Obesity is a complex problem whose origins are based on a number of interrelated factors. Inadequate emotional response, and social and psychological difficulties are invariably cited as part of the general problematic that involves obesity; these include rejection by a peer group, dating difficulties, isolation, depression, aggressiveness, anxiety, and low self-esteem.

All these aspects have great importance for the healthy development of an individual, especially during adolescence, and a satisfactory and adjusted performance in these social fields presupposes the development of certain social abilities.

Recently, a number of avenues of research in behavior therapy have dealt with questions associated with relations among variables and among responses. Functional analysis is the instrument used for deciding which behaviors should be targeted during intervention, since it is common for the presented complaint to be part of a complex of interrelated behaviors – a response class – which will be discovered during therapy, as well as its function and incompatibilities (Meyer, 1997).

In the case of overeating, functional analysis must indicate the behavioral function, in other words, what are the consequences reinforcing the overeating. It also has to identify if there are any other behaviors in the behavioral repertoire of the individual that have a similar function to overeating but that are not harmful to the individual. If not, new behaviors may need to be installed. These other behaviors can involve directly or indirectly a variety of social abilities and would be then differentially reinforced. Thus, if the generic function of overeating is the avoidance of difficult social situations for the client, the procedure derived from this analysis may be educating or strengthening behaviors that may transform social approaches in pleasant occasions, instead of feared. If the main maintaining consequence of excessive caloric ingestion is the attention from the family, the change strategy which derives from this analysis may be reinforcing direct communication forms. In this case, the client can start to request attention in a direct form and no longer in an indirect and inadequate form, namely overeating.

Multiple behaviors have been emphasized in clinical research (Sturmey, 1996) and the complex question of which behaviors require treatment during therapy has been much debated, since the majority of clients present multiple and interrelated problems. Novel forms of treatment must deal with this

question and try to discover and develop more adequate and important new replacement behaviors, which could become concurrent responses “against” the behavioral problem and favor adaptation.

The relation between responses was also pointed out by Craighead, Kazdin and Mahoney (1994); many behaviorists believe, they note, that behavioral problem alteration may result in improving other aspects in the individual’s life, or that beneficial treatment effects may be generalized for other behaviors.

Dow (1994) presented a planned behavioral intervention based on the relations between responses; he argued about the possibility of success in treating depression without directing the attention to the depression complaints. The clients entered in a program of social-abilities training, which led them to an improvement in the behaviors related to the depression and which showed the importance of developing adequate alternative behaviors.

Thus, a review of the literature on obesity indicates that obesity is often interrelated with non-physiological variables, including emotional, familial, and social. Functional analysis of clinical problems also frequently indicates that behavioral problems are related to others parts of the individual’s behavioral repertoire, especially with the absence of a social repertoire. It seems useful, then, to analyze the relations between responses, which may permit to modify one or few interrelated behaviors, and then to observe changes in many of them.

This form of analysis and intervention was proposed for the present study instead of other behavioral treatments for obesity already tested. Other traditional treatments, which target diet and exercise, although they promote weight loss, do not assure that it will be maintained. Thus, the study intended to verify if a treatment that targeted other behaviors related to excessive eating, selected through functional analysis, and that did not target the behavioral patterns of eating and exercise, also would lead to weight reduction. By determining and understanding the complex inter-relationship between the different behavioral changes accompanying weight loss, a more complete and tailored form of treatment may than be developed.

The objective of this research was to identify behaviors related to excessive eating in obese adolescents, to promote changes through a behavioral therapeutic process, and to verify if changes in these related behaviors would be followed by a change in weight

Method

Participants

Two obese adolescents participated in this study. They presented other behavioral complaints such as anxiety, chronic headache, shyness, as well as difficulties with familial and social relationships. During treatment they agreed not to participate in any other type of psychological treatment, or in any other weight-loss treatment.

The first client, female, 13 years and 10 months old at the beginning of treatment, was in the seventh grade, from a low socioeconomic stratum. Her body mass index[1] was 32.1, which is considered obese, and she weighed 85.2 kg. The second client, male, 16 years and 6 months old at the beginning of treatment, was in the eighth grade, also from a low socioeconomic stratum. His body mass index was 33.8, which is also considered obese, and he weighed 111 kg.

[1] Body Mass Index is (B.M.I.) is obtained through the formula: weight in kilograms/height². Individuals with B.M.I. between 25 and 30 are considered overweight, between 30 and 40 are considered obese and superior than 40 are considered morbid obese (Halpern, 1998).

Procedure

The clients were treated in individual therapy, weekly, at the Behavioral Therapy Laboratory at the Psychology Institute at University of São Paulo. All sessions were videotaped with the permission of the client and his/her parents. The psychological treatment, as discussed with the clients, was based on general objectives related to the various behavioral complaints and were not focused directly at the obesity problem. The therapist analyzed functionally, with each client, the problem-situation brought for the sessions searching an understanding and possibilities of changes in the established relations between the client's responses and the environment variables.

By reviewing the videos of the sessions, the therapist created categories of behavior for each client, which allowed a continuous evaluation of the change process, following thus, the single subjects design principle of collection of repeated measures. The categories of desirable and undesirable behaviors were elaborated and described, and ended up practically identical for both clients. For each session, the occurrence or non-occurrence of each category was recorded (only once per session). Two graduate students in psychology made the same register with a sample of sessions and got a reliability measure of 85%.

Categories of undesirable behaviors

1. *Anxiety (A):* Sweating, snapping of the fingers, body movements, and gesticulation during the session**;** 2. *Dependence on the mother (D):* indicators of dependence, such as seeking aid in routine daily tasks, attention from and frequent company of the mother; 3. *Avoidance/Isolation of colleagues (AV):* do not seek, or actively avoid contact with others, poor interaction at school or other places; 4. *Lack of assertiveness with colleagues (IC):* acceptance of colleagues' impositions without expression of discomfort or discordant feelings; 5. *Lack of assertiveness with the mother (IM):* acceptance of the mother's impositions, without expression of discomfort or discordant feelings; 6. *Competitiveness (C):* Report of competitive behaviors, such as comparisons, judgment, competition; 7. *Inflexibility (I):* Report of behaviors of authoritarianism and inflexibility, as in the evaluation or lack of acceptance of other people's needs as different from one's one, and refusal to accept leadership; 8. *Justifications (J):* Use of justifications for explaining one's behavior options; 9. *Pessimistic cognition (PC):* Identification only of negative aspects when reporting events and/or indications of discouragement; 10. *Familial fights (F):* Report of occurrence of quarrels between parents and/or the possibility of conjugal separation; 11. *Aversive events (AE):* Report of situations considered aversive, contingent or not on behaviors.

Categories of desirable behaviors

1. *Spontaneity during interaction (SR):* Fluency in reporting events; 2. *Approach to colleagues (AC):* Report of interaction with others; 3. *Physical activity (PH):* Report of physical activity during the week; 4. *Written task (T)*: Delivery of homework assignment requested in the previous session; 5. *Analysis of own behavior (AB)*: Identification of relations between one's emotions, thoughts, behaviors, as well as consequences of these for oneself and the others; 6. *Identification of own feelings (IF)*: Identification and naming of feelings and emotions during the session; 7. *Identification of other's feelings (IO):* Demonstration of interest for others' feelings and perception of being different from ones; 8. *Adequate expression of feelings (EX):* Expression of positive and negative feelings in a clear and objective form, during the session and/or in reported situations; 9. *Identification of own qualities (IQ):* Verbalization of positive aspects in oneself, spontaneously or after the therapist's indication; 10. *Relaxation (R):* Occurrence of relaxation training in the session or reference to its realization at home; 11. *Behavior concurrent to eating (CE):* Report of other alternative behaviors in the occasions identified as having a high probability of "exaggerated eating"; 12. *Expression of emotion in the own speech (EH):* Verbal and non-vocal behaviors, such as voice tone and body language congruent with the reporting of emotions; 13.

Confrontation (C): Report of participation in academic and/or social events considered as difficulties; 14. *Initiatives (IT):* Report of initiative for resolution of daily difficulties, considering own feelings (behavior tendencies); 15. *Pleasant events (PE):* Report of pleasant and/or satisfactory situations, contingent or not on behaviors.

Beyond these categories, the themes cited were analyzed (social relations (RS), family (Fa), school (S), food (TA)) as well as the weight (W) measured each session. For each client, the categories and themes were correlated to verify if relations could be identified between responses, that is, responses with a high or low probability of their occurring together. The correlation between the categories was carried out by the computerized SPSS statistical program, and the Spearman bilateral test was used, allowing results with significance levels between .01 and .05 .

Results

Functional Analysis

Based on the data of initial interviews, observation and client's reports, a descriptive functional analysis (Sturmey, 1996) was derived which identified central behavior classes, its probable acquisition and its maintaining consequences.

Behavior classes for client 1:

- Overeating.
- Isolation and difficulty in social relationship.
- Difficulties in expressing feelings in family and social environments.
- Extreme dependence on the mother (the client did not leave the house alone; she reported everything that happened to the mother and asked for assistance in all moments for daily basic activities, such as, for example, combing hair).
- "Nervousness" (she yelled out or was aggressive when things did not happen as she desired).
- Pessimistic covert behaviors and low frequency of observation of positive aspects in social and/or school relations.

Hypotheses of acquisition and maintenance:

- Lack of repertoire related to different social abilities that would favor a better social and family interaction.
- Positive reinforcement by the mother of the dependent behaviors (the father was indifferent, only the mother followed her to all places, bought special foods, combed her hair, chose her clothes).
- Lack of reinforcement and even punishment related to initiatives (the mother did not allow her to go out alone and tried to protect her from others), hindering the client from becoming close to other people.
- Absence of leisure and other sources of social reinforcement.
- Aversive situations when interacting with others and/or with relatives (non-acceptance by school colleagues because of imposition of rules on them, name-calling and bullying).
- Sedentary life.
- Inadequate eating habits in the home (family often ate pizza and/or sandwiches instead of meals, at irregular hours).

Behavior classes for client 2:

- Overeating.
- Avoidance and isolation in social and family relationships (shyness).
- Generalized anxiety in social situations (sweating, loss of speech).
- Covert behaviors of incompetence (he believed that would not be able to face new situations, in the family or school environment).

Hypotheses of acquisition and maintenance:

- Weak repertoire of social abilities that could favor confrontational behaviors in different social situations (lack of assertiveness).
- Reduced social reinforcement (rarely went outside, except to go to school or to older relative's house).
- Dangerous neighborhood, making interaction with other adolescents difficult.
- Absence of adjusted parental models of expressing feelings (the client had no father at home, and mother did not appear to be an adequate model).
- Aversive events at school (rebukes and threats).

Categories of behavior analysis

The researcher created 24 categories, 11 considered undesirable and 13 desirable, for Client 1. The desirable and undesirable categories were added for each session and are shown in Figure 1, together with weight, during the 40 sessions. Figure 1 shows that undesirable categories fluctuated during treatment and the desirable ones increased, but also with variations. An increase in the concentration of desirable behavior occurred followed by a reduction in the concentration of undesirable behaviors at the end of the treatment. Weight had increased, with some fluctuations, during the entire treatment. Until the seventeenth session, it went from 85 to 87 kg, and from the eighteenth, it began to increase, reaching 92.5 kg in the thirty-first session. From there on, it showed a slight decreasing trend, reaching 90 kg in the final session.

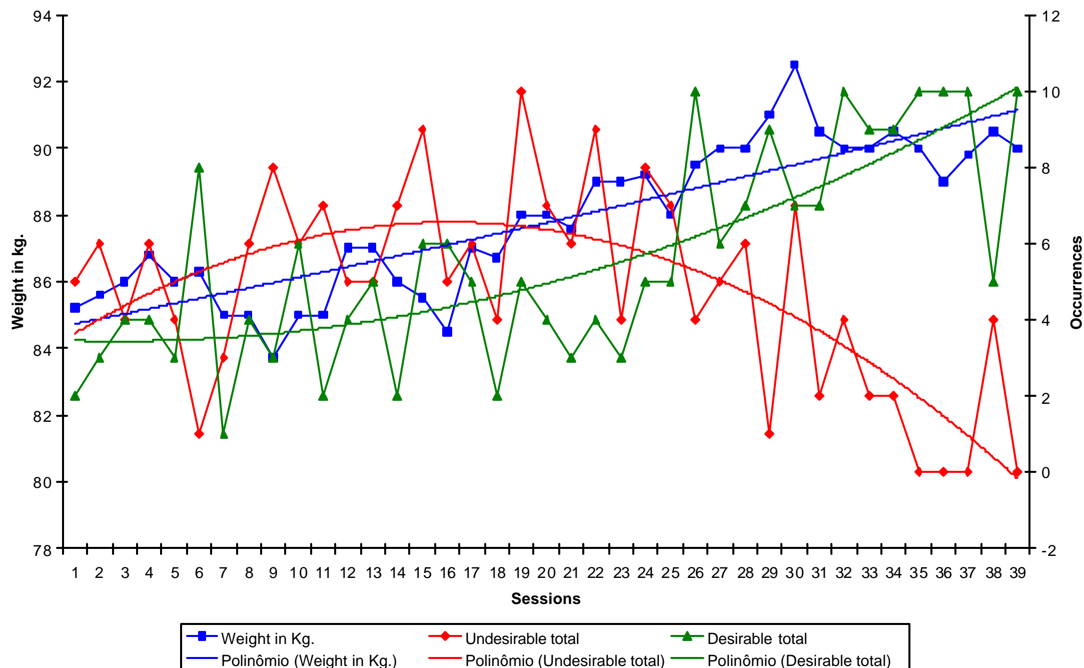

Figure 1. Total of desirables, undesirables and weight by session for client 1

For Client 2, 20 categories of behavior were identified, seven undesirable and 13 desirable, and four themes were discussed during the sessions. The sum of desirable and undesirable categories, together with weight, during 16 sessions is shown in Figure 2. An increase in the concentration of desirable

behaviors and a reduction in the undesirable ones was observed during treatment. These results showed that the client strengthened and/or developed a favorable behavioral repertoire during treatment. Weight showed a continuous reduction, from 111 kg in the first session to 102 kg in the sixteenth session, which was part of the monthly follow-up. After two months, in the next follow-up, the weight had dropped to 100.3 kg.

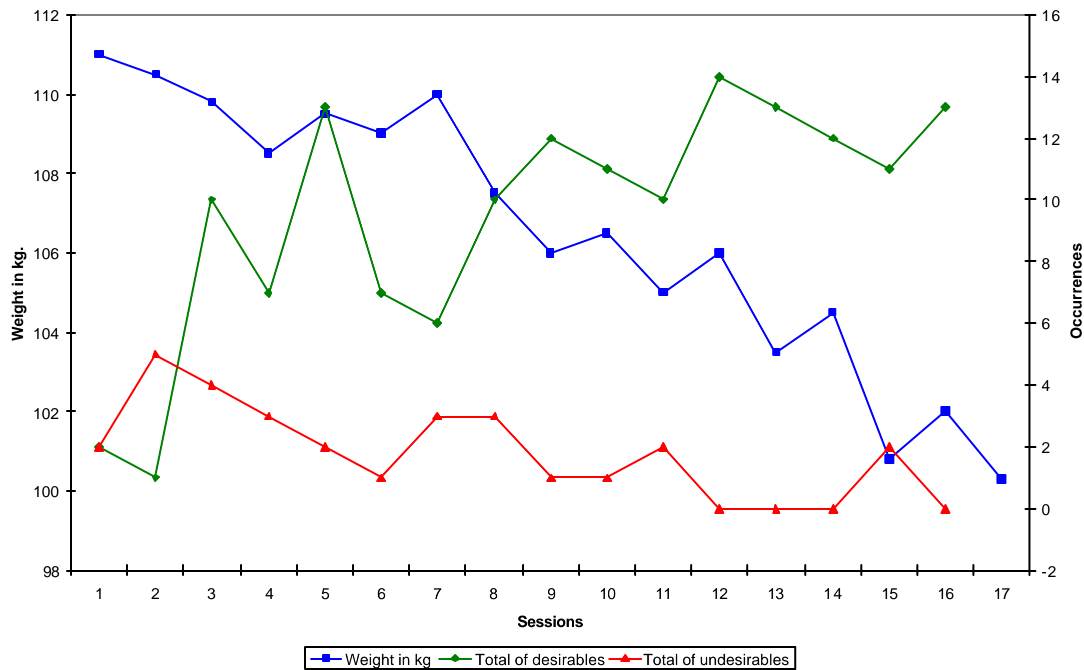

Figure 2. Total of desirables, undesirables and weight by session for client 2

Correlations

The number of significant correlations for Client 1 was 193, for Client 2, 76, as illustrated in Figures 3 and 4. The first column contains category codes and names. The white squares indicate the desirable factors, those in gray indicate the undesirable ones, and those in black indicate the themes. The following columns show the category codes with significant correlations. First, the positive correlations were placed, then the negative ones in italic. The lines were ranked in decreasing order according to the number of positive correlations, and then the negative ones were indicated. Categories that had appeared more than once in the line or in the column, indicating correlations with more than one category, were highlighted. The correlations that appeared just once in the line and/or column were not highlighted.

The resultant groupings of this correlation data from Client 1 is shown in Figure 3. Inflexibility correlated positively with justifications, competitiveness, lack of assertiveness with colleagues, avoidance/isolation of colleagues and with aversive events. These categories had several indices of significant correlations among themselves. The category anxiety also showed correlation with this group. A grouping of response categories emerged that was called Group I – Undesirable, for containing seven of the 12 undesirable ones.

Group II emerged for having no positive correlations with Groups I and III; it contains six categories: dependence on the mother, family fights, lack of assertiveness with the mother, the theme family, relaxation and written task. It was called "family" because these categories were somehow related to the family. The categories relaxation and written task, although

Category																											
I = Inflexibility	I	J	C	IC	AV	AE									*C*	*PE*	*IO*		*EX*	*IF*	*IT*	*IQ*		*Fa*		
J = Justifications	I	J			AV		A						Fa		*C*	*PE*	*IO*		*EX*	*IF*		*IQ*				
AE = Aversive events	I		C			AE										*PE*	*IO*		*EX*			*IQ*	*W*			
IC=Lack of assertiviness with colleagues	I		C	IC										AC	*C*		*IO*		*EX*		*IT*					
C = Competitiveness	I		C	IC															*EX*		*IT*			*Fa*		
AV=Avoidance/Isolation of colleagues	I	J			AV																*IT*					
A = Anxiety		J					A																			
PC = Pessimistic cognition																	*IO*									
Group I - Undesirable:	I	J	C	IC	AV	AE	A																			
D = Dependence on the mother								D	F	IM	R	T	*Fa*		*C*			*AC*	*EX*		*IT*		*W*		*RS*	
F = Familial fights								D	F	IM	R	T	*Fa*	PE				*AC*							*RS*	
R = Relaxation									F		R				*C*	*PE*		*AC*		*IF*						*D*
IM=Lack of assertiveness with the mother								D	F	IM		T			*C*											
T = Written task								D	F	IM		T														
Group II - Family:								D	F	IM	R	T	*Fa*		*C*	*PE*	*IO*	*AC*	*EX*	*IF*	*IT*	*IQ*	*W*	*Fa*	*RS*	
															Group III - Desirable											

Themes: Fa=Family; TA=Eating; RS=Social relations

Category																								
C = Confrontation	C	PE	IO		AC	EX	IF	IT	IQ	CE		W		*I*	*J*		*IC*			*D*		*IM*	*R*	
EX = Adequate expression of feelings	C	PE	IO			EX		IT	IQ		EH			*I*	*J*	*C*	*IC*		*AV*	*D*				*TA*
IQ = Identification of own qualities	C	PE	IO		AC	EX		IT	IQ		EH	W			*J*				*AV*					*TA*
IO = Identification of other's feelings	C	PE	IO	AB		EX	IF		IQ			W		*I*	*J*		*IC*		*AV*					
W = Weight	C	PE	IO	AB	AC			IT	IQ	CE		W							*AV*	*D*				
IT = Initiatives	C	PE				EX		IT	IQ			W		*I*		*C*	*IC*	*AV*						*TA*
PE = Pleasant events	C	PE	IO	AB	AC	EX	IF	IT	IQ			W												
AC = Approach to colleagues	C	PE			AC				IQ		EH	W	IC							*D*	*F*		*R*	
AB = Analysis of own behavior		PE	IO	AB								W		*I*	*J*				*AV*				*R*	
IF = Identification of own feelings	C	PE	IO				IF							*I*	*J*					*D*			*R*	
EH=Expression of emotion in own speech					AC	EX			IQ		EH			*I*										
CE = Behavior concurrent to eating	C									CE		W												
Group III - Desirable:	C	PE	IO	AB	AC	EX	IF	IT	IQ	CE	EH	W		*I*	*J*	*C*	*IC*	*AV*	*AV*	*D*	*F*	*IM*	*R*	*TA*
														Group I and II -Undesirable										

Figure 3. Groupings of significant positive correlations and negative correlation (*in italics*) for the response categories, themes and weight for client 1 (see explanation in text).

Category	Positive correlations	*IQ*	*C*	*IF*	*IT*	*AB*	*AC*	*SR*	*PE*	*EX*	*T*	*PH*
D = Dependence on the mother	IC											
AV=Avoidance/Isolation-colleagues					*IT*		*AC*					*PH*
AE = Aversive events	IM								*PE*			
IC=Lack of assertiviness with colleagues	D		*C*					*SR*			*T*	
IM=Lack of assertiviness with the mother	W, AE	*IQ*	*C*						*PE*	*EX*		
J = Justifications												*PH*
W = Weight	IM	*IQ*	*C*	*IF*	*IT*	*AB*	*AC*	*SR*	*PE*	*EX*		
Group I - Desirable:		*IQ*	*C*	*IF*	*IT*	*AB*	*AC*	*SR*	*PE*	*EX*	*T*	*PH*

Category	IQ	C	IF	IT	AB	AC	EH	SR	PE	EX	T	PH	*IC*	*W*	*AV*	*IM*	
AC = Approach to colleagues		C	IF	IT	AB	AC								*W*	*AV*		
PH = Physical activity							EH					PH			*AV*		*J*
AB = Analysis of own behavior		C	IF		AB	AC								*W*			
C = Confrontation	IQ	C			AB	AC		SR		EX			*IC*	*W*		*IM*	
PE = Pleasant events			IF						PE					*W*		*IM*	*AV*
SR = Spontaneity during interaction	IQ	C						SR			T		*IC*	*W*			
EH=Expression of emotion in own speech	IQ						EH			EX		PH					
EX =Adequate expression of feelings	IQ	C		IT						EX				*W*		*IM*	
IQ = Identification of own qualities	IQ	C	IF				EH	SR		EX	T			*W*		*IM*	
IF = Identification of own feelings	IQ		IF		AB	AC			PE					*W*			
IT = Initiatives				IT		AC								*W*	*AV*		
T = Written task	IQ							SR			T		*IC*				
Group I - Desirable:	IQ	C	IF	IT	AB	AC	EH	SR	PE	EX	T	PH					
Group II - Undesirable:													*IC*	*W*	*AV*	*IM*	

Figure 4. Groupings of significant positive correlations and negative correlations (*in italics*) for the response categories, themes and weight for client 2 (see explanation in text).

initially considered desirables, were avoidance forms of familiar fights occurring instead of "facing" the situation (they had negative correlation with confrontation). It was verified that when the client had aggressive-type behaviors, such as competitiveness, inflexibility, use of justifications, or if she reported problems with colleagues, she did not present submission to the mother, which had greater probability to be reported when she indicated occurrence of family fights.

Group III was called "desirable" for containing 11 of the 13 desirable categories, and, contrary to the initial hypothesis, the weight correlated positively with eight of these desirable ones and negatively with two undesirable ones. In a general way, the same groupings were replicated with the negative correlations, but, for these ones, only two groups had emerged. The combined group was called "undesirables".

The resultant groupings of the correlation data from Client 2 are shown in Figure 4. For this client, two groupings of response categories emerged. Group I, desirable ones and Group II, undesirable ones. Positive and negative correlations were determined. Group II contained only four of the eight categories classified as undesirable and were grouped only with the negative correlations. The positive correlations were sporadic, did not present a pattern and did not appear more than once in the lines and columns. In fact, the most important change observed for this client was the steady increase of the desirable categories from the beginning to the end of treatment. The categories considered undesirable occurred in smaller number since the beginning, but still showed a decreasing trend, as seen in Figure 2.

Discussion

For both clients relations between overeating and other behaviors were identified. For Client 2 the treatment based on the functional analysis without focus on obesity complaints was useful for weight loss and for developing different social abilities. For Client 1, the relation among responses was also clear,

although she presented slower progress in the development of the behavioral repertoire and, only in the last 10 sessions, presented a weight reduction trend.

The functional analysis was an important instrument not only for the individualization of the treatment but also for data analysis. Although the choice had not been intentional, each client presented a different function of overeating. Initially both presented a lack of adjusted social repertoire, however for Client 2 the behavior of overeating did not have an important positive reinforcer keeping it. His behaviors seemed to be maintained by escape and avoidance of social situations. For Client 1, the social reinforcing consequences were very strong, maintaining overeating as well as other identified behavior problems. When actual positive reinforcement for problem behavior occurs, changes in the therapy process tend to be slower.

The use of categories for data collection and analysis was an option with many advantages. The categories were defined during treatment and were based on the perception of the therapist[2] about what was most relevant for each client, considering the goals of each case, being an individualized work tool. Furthermore, as a result of repeated measures, it was possible to follow the change process, which is a first step for an eventual use of a single subject experimental design. It also allowed the analysis of response relations.

As a form of conducting clinical research, categorization could be carried out directly by videotape observation, without the need of time-consuming session transcription, and, still allow reliability test. The recording of occurrence/non-occurrence for each category was not a sophisticated measure because it did not consider the frequency or other response dimensions. For future studies, this procedure should be reviewed for obtaining more discriminating measures, having already been developed in Yano's (2003) study.

It must be considered that the interpretations from case studies are always tentative. Advances in behavioral clinical researches are derived from the cumulative effects in several studies (Barlow, Hayes & Nelson, 1984, Kazdin, 1992, 1998). The search for better understanding of all variables involved must continue through new experimentation and treatment proposals that supplement those already in existence.

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