A Dynamic Systems Analysis of Heterogeneous Family Processes

Underlying Childhood Aggression

by

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A thesis submitted in conformity with the requirements for the degree of Doctor of Philosophy
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ABSTRACT

A number of approaches to subtyping aggressive children were reviewed and it was argued that parsing aggressive children based on whether or not they also exhibit clinically elevated levels of internalizing problems is critical for targeting appropriate interventions. Little research has been conducted on the differences in causal processes that underlie the development of ‘pure’ externalizing (EXT) versus ‘mixed’ externalizing and internalizing children (MIXED). The current dissertation was concerned with locating differences between EXT and MIXED children in their family problem-solving patterns.

A dynamic systems (DS) framework, an approach well-suited for the study of heterogeneous developmental phenomena, was adopted for the current study. There were two phases to the study, a pilot and a hypothesis-testing phase. Data from both phases were combined in the final stage of the analyses. In total, 33 parents and clinically referred children (ages 8 – 12 years old) discussed a problem for 4 minutes and then tried to “wrap up” in response to a signal (perturbation). The perturbation was intended to increase the pressure to resolve the conflict. The main hypothesis was that EXT and MIXED dyads’ interaction patterns would be distinguished only based on their behavioural reorganization after the perturbation. Interactions were videotaped and coded for affective content.

The sequential data were analyzed using a combination of case-sensitive (state space grids and chi-square analyses) and group-based, multivariate techniques (log-linear modeling). As predicted, results revealed differences between the parent-child interactions of
EXT and MIXED children based on dyads’ behavioural reorganization in response to the perturbation. Differences before and after the perturbation were found for MIXED, but not EXT, dyads’ interactions. MIXED dyads shifted from a permissive pattern to a mutually hostile pattern after the perturbation. Specifically, MIXED mothers showed a significant decrease in their tendency to respond to their child’s hostility with neutral responses and a significant increase in their tendency to respond with hostility in kind. This real-time trajectory differed from parents of EXT children who showed a permissive pattern throughout the session. Results suggest that there may be unique parent-child interactions related to subtypes of aggressive children. Theoretical and clinical implications were discussed in light of these findings.
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CHAPTER 1

Introduction

1.1 Scope of the problem

Childhood aggression is a serious, complex problem which impacts not only on the affected child, but also on his or her family, the schools and the community and society at large. Clinically significant aggression problems are not uncommon in the general population: for instance, in the epidemiological Ontario Child Health Study, Offord and his colleagues (1987) found that over 8% of boys and just under 3% of girls between the ages of 4 and 16 met criteria for conduct disorder. Approximately half of all referrals to children’s mental health agencies are for oppositional or aggressive behaviours (Patterson, Dishion, & Chamberlain, 1993; Stouthamer-Loeber, Loeber, & Thomas, 1992) and the stability of aggression across the lifespan has been well-established through both prospective and retrospective studies (Caspi, Elder, & Bem, 1987; Farrington, 1994; Fergusson, 1991; Haapasaio & Tremblay, 1994; Huesmann, Eron, Lefkowitz, & Walter, 1984; Hinshaw, Lahey, & Hart, 1993; McGee, Partridge, Williams, & Silva, 1991; Olweus, 1979; Robins, 1978; Tremblay, Loeber, Gagnon, Charlebois, Larivee, & LeBlanc, 1991). Additionally, childhood aggression is associated with a host of other serious difficulties. Most notably, early onset of aggression predicts later delinquency and adult criminality (Loeber, 1988; 1990; Patterson, 1982; Stattin & Magnusson, 1989; Tolan, 1987), and is linked to severe psychosocial maladjustment across several domains including poor peer relations (Behar & Stewart, 1982), poor academic functioning (Tremblay, Masse, Perron, LeBlanc, Schwartzman, & Ledingham, 1992), occupational instability, marital problems (Caspi et al., 1987; Loeber, 1990; Patterson, Reid, & Dishion, 1992), depression and substance abuse (Tremblay, Pihl, Vitaro, & Dobkin, 1994).
Given the prevalence, stability, and associated negative outcomes of childhood aggressive behaviour, the development of effective early intervention programs is a top priority for researchers. But appropriate intervention strategies can be developed only if the mechanisms that underlie the development of aggressive tendencies are identified. To this end, particular headway has been made by scholars focusing on socialization factors related to aggression. There seems to be overwhelming evidence that poor parent-child relations and childhood aggression are closely associated and a number of treatment programs have been advanced to target these deviant family patterns. Many of these programs are based on Patterson's (1982) pioneering work on coercive family processes; several of them have shown promising results in decreasing children's problem behaviours (for reviews, see Dumas, 1989; Miller & Prinz, 1990; Southam-Gerow & Kendall, 1997). But despite growing concern from mental health professionals, policy makers and the general public, our most advanced intervention programs often fail to show clinically significant change in many children's aggressive behaviour (Brestan & Eyberg, 1998; Dumas, 1989; Kazdin, 1995; McAuley, 1982; Southam-Gerow & Kendall, 1997). Sadly, a not-so-small proportion of controlled intervention studies actually shows iatrogenic effects (Dishion, McCord, & Poulin, 1999; Lipsey, 1992). After over half of a century of basic research and intervention studies on childhood aggression, why do psychologists continue to observe such variability in treatment outcome?

There are likely many viable answers that can be discussed, but perhaps one of the most important reasons for these equivocal treatment findings is that aggressive children are fundamentally heterogeneous (e.g., Hinde, 1992; Hinshaw & Zupan, 1997; Moffitt, 1993). A variety of structural/causal processes with distinct etiologies are thought to underlie a similar overt (aggressive) pattern (Cicchetti & Richters, 1993). Whereas this variability has long been recognized theoretically, most empirical research in the field continues to employ
designs and methodologies that presume that aggressive children represent a homogeneous group. Moreover, the families of aggressive children are likely to be variable as well, but little research has investigated this diversity. Treatment with many aggressive children may fail because our methodologies presume a uniform causal process and our treatments target that process indiscriminately.

1.2 Overview of Objectives

The main objective of the current dissertation was to identify subtypes of clinically aggressive children and to examine the unique parent-child processes that may underlie these subtypes. To introduce the current study, the following four steps will be taken in the first chapter. First, a variety of subtyping strategies have already been proposed for classifying different groups of aggressive children and different forms of aggressive behaviour; these approaches will be reviewed and their limitations highlighted. Second, it will be suggested that one of the most promising approaches to subtyping aggressive children may be on the basis of whether or not they have clinically significant co-occurring symptoms of depression and anxiety (internalizing problems). The growing literature on differences between children with pure externalizing problems (aggression, attention difficulties) and children with both externalizing and internalizing problems will be critically reviewed, and gaps in this research will be identified. Third, given the long-recognized association between poor parent-child relations and the emergence of childhood psychopathologies, the possibility that different parent-child processes are related to each aggressive subtype will be explored. A handful of studies that have looked at the relation between unique parent-child processes and subtypes of aggressive children will be reviewed in detail, and their theoretical and methodological limitations will be outlined. Finally, it will be suggested that these limitations may be largely overcome by adopting a dynamic systems perspective. An overview of dynamic systems (or
self-organization) principles will be presented and the implications of this new framework for the design of the present study will be elaborated. The chapter will conclude with a brief overview of the design of the current study.

1.3 Subgroups of Aggressive Children and Subtypes of Aggressive Behaviour

In recent years, there have been several attempts to clarify the nature of the diversity of aggressive youth. Four general approaches to classification have been taken. The first approach focuses on differences in developmental trajectories and is based on the age of onset of antisocial behaviour (for review, see Hinshaw & Zupan, 1997; DSM-IV; APA, 1994; McMahon, 1994; Moffitt, 1993). Two subtypes have been identified based on distinct developmental taxonomies: child-onset (also referred to as early-starter and life-course persistent) and adolescent-onset (also referred to as late-onset and adolescent-limited; Hinshaw & Zupan, 1997). Compared to the adolescent-onset subtype, child-onset individuals are more physically aggressive, exhibit oppositional behaviour earlier, experience more serious forms of peer rejection, are less likely to succeed academically, are more likely to show neuropsychological impairments, and are more likely to develop antisocial personality disorder in adulthood (Hinshaw et al., 1993; Moffitt, 1993).

The second approach to classification focuses on grouping children on the basis of differences in the types of aggression they exhibit. There are several dichotomized distinctions that have been proposed. For example, aggressive behaviour has been classified as either instrumental, goal-directed and proactive on the one hand or hostile, retaliatory and reactive on the other (Feshbach, 1970; Dodge, 1991; Dodge & Coie, 1987; Hinshaw & Zupan, 1997). Another distinction has been made between direct and overt aggression (openly physical or verbal) and indirect and covert aggression (e.g., shunning a peer, starting rumours; Hinshaw & Zupan, 1997).
A third strategy of classifying aggressive children uses personality variables (loosely defined) as its distinguishing criteria. Examples include grouping aggressive children on the basis of whether the child's perceptions of self is concordant or discrepant with others' perceptions of the child (Edens, Cavell, & Hughes, 1999), on the basis of biological indices of inhibition versus disinhibition (Newman & Wallace, 1993; Quay, 1993; Windle & Windle, 1993), and according to evidence (or lack thereof) of psychopathy (Lynam, 1997).

Each of these three strategies has received varying degrees of empirical support, but none has been widely accepted in the literature and fewer have shown predictive validity (Edens et al., 1999; Kazdin, 1993; Moffitt, 1993; Vitiello & Stoff, 1997). Perhaps the one exception is Moffitt's (1990; 1993) taxonomies distinguishing between child-onset and adolescent-onset antisocial behaviour (also see Loeber, 1990). These distinctions have been widely accepted and have been incorporated in the DSM-IV. It is important to note, however, that recent evidence indicates that subtypes based on age of onset may not be as reliable, and have the predictive validity, that was previously believed (Bennett, Lipman, Brown, Racine, Boyle, & Offord, 1999; Sanford, Boyle, Szatmari, Offord, Jamieson, & Spinner, 1999). Regardless of the merits of this typology, there remains the question of whether there are distinct subtypes of children within the child-onset group (Edens et al., 1999).

There is an altogether different approach to classifying aggressive children that may have stronger empirical foundations than those already reviewed. Subgroups of aggressive children have been proposed on the basis of other psychopathological symptoms that co-occur with aggression; this research has largely fallen under the rubric of comorbidity studies.¹ Particularly important for the present purposes is a growing body of epidemiological evidence that suggests that a significant proportion of aggressive children and adolescents

¹ For purposes of simplification, comorbidity and co-occurrence are used interchangeably; technically,
also exhibit co-occurring internalizing (i.e., anxiety, depression) symptoms (Bird, Gould, & Staghezza, 1993; Gould, Bird, & Jaramillo, 1993; Harrington, Fudge, Rutter, Pickles, & Hill, 1991; Puig-Antich, 1982; Rose, Rose, & Feldman, 1989; Verhulst & van der Ende, 1992; see Zoccolillo, 1992, for review). Thus, at least two subtypes of aggressive children may exist: "pure" externalizing children (EXT) and "mixed" internalizing and externalizing children (MIXED).

1.4 Co-occurring Externalizing and Internalizing Symptoms

Before proceeding with a more detailed review of the literature on the co-occurrence of childhood psychopathologies, a number of general issues for the field should be noted. First, a central issue in the assessment of childhood psychopathologies involves the use of categorical versus dimensional approaches to classifying dysfunctional behaviour (e.g., Eysenck, 1986; Hinshaw & Zupan, 1997). Categorical approaches assume that clinically disordered individuals differ qualitatively from their 'normal' counterparts; individuals within each group are expected to share similar etiologies and responses to treatment. Clinical diagnoses are given based on a certain threshold of symptom severity. In contrast, dimensional approaches to assessing psychopathology measure behavioural and emotional functioning on a continuum. The more symptoms that are reported, the more severe the psychopathology is deemed. Space limitations preclude a discussion of the relative advantages of each approach, but they have been outlined in detail elsewhere (e.g., Robins & McEvoy, 1990; Richters & Cicchetti, 1993; Hinshaw & Anderson, 1996). The important point to highlight for the purposes of the current review is that there is no definitive consensus in the field regarding which strategy of assessment is best. Although it has been suggested that the best assessment approach combines categorical and dimensional strategies

*comorbidity refers to the presence of two or more diagnosed disorders (e.g., conduct disorder and depression).*
(e.g., Hinshaw & Zupan, 1997; Ollendick & King, 1994), most studies continue to use one approach or the other. Thus, the mixed findings that will be discussed in the following section may be due to differences in assessment approaches.

A second and related issue concerns the variability in measurement tools used to classify children into diagnostic groups. Some studies (including the current one) use rating scales that require parents and/or teachers to report on a child’s behavioural and emotional difficulties. Many of these questionnaires provide reliable and valid multi-informant information with strong predictive power (e.g., Child Behaviour Checklist, Achenbach, 1991a). But these measures are not without their methodological limitations. To name just a few, there may be important respondent biases, particularly when a parent is asked to report on their child’s level of psychopathology. These biases may manifest through over-reporting symptomatology due to the parent’s own degree of psychopathology or distress (e.g., depression), from a strong desire to receive services, from misunderstanding certain items on the checklist, or from “implicit personality theories about disruptive behaviours” (Hinshaw & Zupan, 1996, p. 41). Teacher ratings may also be biased by similar factors. In addition, checklists often lack pertinent information regarding the age of onset and duration of symptoms; thus, these measures are never sufficient to provide a diagnosis. Structured interviews with adults, usually parents, and direct observational techniques are often used to supplement checklists and many of the most respected research investigations (e.g., Patterson, et al., 1992) incorporate all three forms of assessment strategies. Unfortunately, the ideal, comprehensive assessment approach is time-consuming and costly; thus, many of the empirical studies that will be reviewed rely on one or two of these approaches. As a result, it is not clear whether some of the contradictory findings discussed later are not in part due to measurement issues.
Finally, in terms of comorbidity issues specifically, there exists a perennial debate among theorists and researchers about whether the "narrowband" factors of depression and anxiety can be distinguished from one another or whether they represent one "broadband" internalizing cluster of symptoms. Much of the research in the area of childhood comorbidity has been conducted on the relation between the narrowband factors of aggression and depression (e.g., Capaldi, 1991, 1992; Capaldi & Stoolmiller, 1999; Dadds, Sanders, Morrison, & Rebgetz, 1992; Harrington et al., 1991; Miller-Johnson, Lochman, Coie, Terry, & Hyman, 1998; Patterson & Stoolmiller, 1991; Quiggle, Garber, Panak, & Dodge, 1992; Sanders, Dadds, Johnston, & Cash, 1992) and, to a lesser extent, on the relation between aggression and anxiety (e.g., Ialongo, Edelsohn, Wertheramer-Larsson, Crockett, & Kellam, 1996; Kashani, Deuser, & Reid, 1991; McBurnett, et al., 1990; Speltz, McClellan, Deklyen, & Jones, 1999; Walker, et al., 1991), but there is strong evidence that these associations actually occur between the broadband externalizing and internalizing levels (e.g., Achenbach, 1991a; Achenbach, Conners, Quay, Verhulst, & Howell, 1989; Gjone & Stevenson, 1997; Quay, 1986; Weiss, Jackson, & Susser, 1997; Wolfe, et al., 1987; Weiss & Catron, 1994; Weiss & Weisz, 1988; Werry, 1985; Wright, Zakriski, & Drinkwater, 1999). Distinct patterns of associated features have not been convincingly shown for disorders within the externalizing or internalizing domains (e.g., Werry, Reeves, & Elkind, 1987). For example, little discriminant validity has been found between the constructs of childhood depression and anxiety (Kazdin, Esveldt-Dawson, Unis, & Rancurello, 1983; M. L. Patterson, Greising, Hyland, & Burger, 1997; Saylor, Finch, Baskin, Furey, & Kelly, 1984; Shoemaker, Erickson, & Finch, 1986; Wolfe et al., 1987). Many researchers agree that, "the combination of a high degree of comorbidity and the lack of a distinctive matrix of associated features for many of the disorders has led to the realization that the categories of disorder in existing classification [systems] are overrefined..." (Offord, 1995, p. 285). Thus, the current review will focus on
summarizing research in terms of the broader categories of externalizing and internalizing problems.

It is widely accepted that childhood internalizing and externalizing problems co-occur in both community and clinical samples at a rate greater than would be expected by chance (Fleming & Offord, 1990; Harrington, et al., 1991; Puig-Antich, 1982; Zoccolillo, 1992; Verhulst & van der Ende, 1992). But if “pure” externalizing children (EXT) and “mixed” internalizing and externalizing children (MIXED) represent two qualitatively distinct subtypes of aggressive youth, then there should be differences in the risk factors and long-term outcomes associated with each group. To date, the empirical evidence for differentiating these two groups is somewhat equivocal. Several epidemiological studies have found no differences between risk factors associated with the co-occurrence of aggression and internalizing symptoms versus aggression alone. For example, Rutter and his colleagues (1970) found no differences on a number of independent correlates (e.g., age, sex, family size, reading ability, marital discord) between conduct disordered children with a co-occurring anxiety or depressive disorder (MIXED) and pure conduct disordered children (EXT). With reference to long-term outcomes, in an 18-year follow-up of their clinical sample of British children, Harrington and associates (1991) found that MIXED and EXT children were similar in their likelihood to commit a crime, develop depression, and develop antisocial personality disorder. Finally, in his review of a large body of epidemiological comorbidity studies, Zoccolillo (1992) suggested that the “data do not support the hypothesis that subjects with a mixed diagnosis are a less antisocial group [than pure externalizers]...” and that the two groups are more similar than different in terms of their severity of antisocial behaviour and their longitudinal outcomes. The author concluded by speculating that comorbid and single-disordered children may share a single underlying global disorder.
On the other hand, results from recent studies have begun to suggest that EXT and MIXED children do indeed represent two distinct subgroups. Findings from large-scale studies have started to reveal differences in developmental pathways, associated difficulties, and responses to treatment, depending on the particular dysfunction co-occurring with aggression (e.g., Capaldi, 1991, 1992; Capaldi & Stoolmiller, 1999; Hinshaw & Anderson, 1996; Hinshaw et al., 1993; Lahey & Loeber, 1994; Verhulst & van der Ende, 1992). Several studies suggest that MIXED children are generally at higher risk for a number of negative outcomes, compared with EXT children. For example, Harrington and his colleagues (1991) found that depressed children with CD (MIXED) fared significantly worse than children with CD only (EXT) in terms of their degree of recovery and degree of handicap at the end of psychiatric treatment. Regarding long-term outcome, Verhulst and van der Ende (1992) showed that MIXED children were more likely than their single-syndrome counterparts to continue exhibiting problem behaviours six years after their first assessment. The interaction of conduct problems and depression, compared to either problem alone, has also been related to increased risk of substance use, poorer academic performance (Capaldi, 1991), and an increased risk of suicide in adolescence (Brent, et al., 1988; Shafii, Steltz-Lenarsky, Derrick, Beckner, & Whittinghill, 1988). Following the same cohort from adolescence to early adulthood, Capaldi & Stoolmiller (1999) found that the MIXED group continued to have pervasive failures in several domains and their overall adjustment was poorer than the EXT group. Tolan and Henry (1996) reported similar findings from their epidemiological study of children from poor urban communities.

In sum, there is growing empirical evidence showing that children with co-occurring externalizing and internalizing problems fare worse than children with externalizing problems alone. These data suggest that an internalizing disorder in the presence of aggression acts in an additive fashion to increase risk. But the combination of internalizing and externalizing
symptoms may be more parsimoniously viewed as a qualitatively distinct condition with unique properties that cannot be attributed to the sum of each condition alone (Caron & Rutter, 1991).

Gjone and Stevenson (1997), in their Norwegian national twin study, found that genetic factors were more influential in the development of a pure externalizing behaviour problem (EXT), while shared environmental factors were more influential in comorbid cases (MIXED). They concluded that their findings supported a model in which "comorbid depression and conduct disorder could be classified as a separate diagnostic group" (p. 284). Kershaw and Sonuga-Barke (1998) cluster analyzed a large sample of school-aged boys identified with "special educational needs" and found that children with comorbid conduct and emotional difficulties formed a subgroup distinct from children with CD alone. In terms of social functioning, Wright, Zakriski, and Drinkwater (1999) conducted a fine-grained observational study which revealed two distinct patterns of child-context interactions for MIXED and EXT children. Their findings suggested that "mixed cases were qualitatively different in their overall patterns and in their proclivity to be both withdrawn and aggressive in response to nonthreatening peer interactions" (p. 105). Finally, studies comparing comorbid depressed and conduct disordered children with depressed only children also suggest that the comorbid group is distinct in several qualitative ways (Angold & Rutter, 1992; Cole & Carpentieri, 1990; Fleming, Boyle, & Offord, 1993; Volkmar & Woolston, 1997). For example, MIXED children have been found to be more socially rejected or rated as "controversial" (popular according to some peers and disliked according to others) compared to EXT or depressed alone children (Cole & Carpentieri, 1990). Taken together, there seems to be some convincing evidence for the idea that children with both externalizing and internalizing symptoms represent a unique group with qualities distinct from pure internalizers and pure externalizers. To better understand the heterogeneous nature
of childhood aggression specifically, it seems crucial to study the potentially distinct causal mechanisms that contribute to the development of individuals with MIXED versus EXT symptoms.

1.5 Parent-child Relations with MIXED and EXT Children

Although there exists some information about the differences in risk factors and outcomes that may be associated with MIXED and EXT children, we know almost nothing about the underlying mechanisms that may cause these differences. Given that parent-child interactions are one of the central causal factors implicated in the development and etiology of childhood psychopathology in general (e.g., Dadds, 1987; Kazdin, 1987; Maccoby & Martin, 1983), it seems reasonable to hypothesize that particular parent-child processes may lead to different clusters of childhood symptomatology. Recent empirical evidence suggests that unique parent-child processes may indeed discriminate between diverse types of child psychopathology (Capaldi, 1991, 1992; Capaldi & Stoolmiller, 1999; Cole & Rehm, 1986; Dadds, Sanders, Morrison, & Rebgetz, 1992; Donnenberg & Weisz, 1997; Sanders, et al., 1992). But several researchers have argued that common determinants underlie the development of both internalizing and externalizing problems (e.g., Goodyer, 1990; Sines, 1987; Rutter, 1989). For example, child aggression, depression and anxiety have all been linked to parental hostility and criticism (e.g., Burbach & Boduin, 1986; Loeber, 1990), neglectful and disorganized parenting (e.g., Goodyer, 1990; Sines, 1987; Rutter, 1989), and power-assertive parenting strategies (Huffington & Sevitt, 1989; Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1994; Shaw & Bell, 1993). As mentioned earlier, it may be argued that variability in measurement tools can account for these contradictory positions. Interviews and questionnaire strategies, because they tend to focus on general descriptions of parenting, may lead to the general findings that 'harsh' or 'critical' parenting leads to child
psychopathology in general. In contrast, observational studies may focus more on specific parent and child behaviours and may yield findings that point to differences in parent-child relations according to specific types of psychopathology. If MIXED and EXT subtypes are truly two distinct groups of aggressive children, it might be expected that the parent-child processes associated with each group would differ in some way. Before exploring the evidence for this hypothesis, it is helpful to review what is already known about the parent-child interactions related to pure externalizing and pure internalizing problems.

Given the serious outcomes associated with early aggressive behavior, it is not surprising that a large body of research has focused on identifying the socialization factors that contribute to the development and maintenance of aggressive behaviour. These studies have repeatedly found a link between poor parent-child interactions and children’s externalizing problems (e.g., Dumas & LaFreniere, 1995; Forehand & McMahon, 1981; Lahey & Loeb, 1994; Loeb, 1988; 1990; Loeb & Stouthamer-Loeb, 1986; Patterson, 1982; Patterson & Reid, 1984; Patterson, et al., 1992; Schachar & Wachsmuth, 1990; Wahler, 1975; Wahler & Dumas, 1989). The most consistently validated findings have come from Patterson and his colleagues’ at the Oregon Social Learning Center. Through the sequential analysis of moment-to-moment family interactions, Patterson (e.g., 1982; Patterson, et al., 1992) showed how parents “train” children to become aggressive. The process begins innocuously enough, with the parent repeatedly requesting compliance from her toddler and the child responding coercively (oppositional) in turn (e.g., whining, tantrums). Aggressive and oppositional solutions on the part of the child are reinforced through what Patterson has termed the coercive cycle: when a parent yields to a child’s coercive behaviour, the child’s behaviour is terminated in the ‘short run’ but these oppositional behaviours are reinforced and, thus, are more likely to re-occur in the future. The parent’s withdrawing behaviour likewise becomes reinforced because, as a result of letting the child ‘win,’ the tantrums desist
and the parent is rewarded with temporary peace. This pattern becomes entrenched through hundreds of similarly repeated interactions and, in time, the parent sets fewer and fewer limits on the child’s hostile and oppositional behaviour. Similar constellations of parent-child patterns have been grouped under the label of permissive (e.g., Baumrind, 1971; Baumrind, 1991), inconsistent, or indiscriminant parenting (Dumas & LaFreniere, 1993; Dumas & LaFreniere, 1995; Dumas, LaFreniere, & Serketich, 1995).

Throughout childhood, mutually hostile parent-child exchanges stabilize and grow longer in duration, escalating in amplitude and increasing the probability of physical aggression (Snyder, Edwards, McGraw, Kilsgore, & Holton, 1994). Snyder and colleagues (Snyder, Schrepferman, & St. Peter, 1997; Snyder & Patterson, 1995) have argued that aggressive children also lack the skills to regulate negative emotion during family conflicts; in challenging situations, this results in the disruption of information-processing and leads them to rely on automatized aggressive responses. Lack of monitoring or lax supervision, little positive involvement (Capaldi & Patterson, 1991; Patterson, et al., 1992), and poor family problem-solving skills (Forgatch & Patterson, 1989) have also been linked to the development of childhood aggression.

In addition, lack of positive parenting practices have been shown to lead to aggression. Studies have shown that close monitoring, maternal warmth and sensitivity, positive verbal communication, and joint activities of play and conversation between parents and their children are associated with lower levels of aggression (Gardner, 1987, 1994; Pettit & Bates, 1989; Pettit, Bates, & Dodge, 1993). In non-clinical samples, parental warmth (Werner & Smith, 1982) and warm affect reciprocity between parents and children were found to relate to greater compliance in children (see Maccoby & Martin, 1983, for review). Thus, many writers have argued for the importance of studying positive parenting behaviours,
as well as coercive ones, when considering the etiology of childhood aggression (Gardner, 1987, 1994; Pettit, et al., 1993; Rutter, 1985).

Although clearly there has been considerable progress in mapping the developmental precursors and paths to childhood aggression, it is critical to recognize that, in general, the studies just reviewed compared aggressive children to a ‘normal’ control group. None of them attempted to further parse aggressive youth into potential subtypes and to examine differences in their parent-child relations. As a result, although we have a solid understanding of what differentiates aggressive children’s family interactions from their non-clinical counterparts, we have little knowledge about the potentially diverse family processes among aggressive youth.

Turning to childhood internalizing problems, a similar set of family interaction patterns seems to be associated with this cluster of symptomatology (e.g., Burbach & Borduin, 1986; Cole & Rehm, 1986). In general, theorists have suggested that depressed children develop emotional difficulties, in part, from being exposed to a harsh, critical and rejecting parent (Burbach & Borduin, 1986; Sanders et al., 1992). Studies have demonstrated that parents of depressed children are often detached, punitive and belittling (Poznanski & Zrull, 1970) and may be abusive and cruel to their children (Puig-Antich, Blau, Marx, Greenhill, & Chambers, 1978). In terms of the parent-child relationship, depressed children and their mothers have been found to have poorer communications with less shared affection than psychiatric and normal controls and their mothers (Capaldi, 1991). Similar to aggressive children, direct observational studies have shown that depressed children and their families show deficits in interpersonal problem-solving skills (Sanders et al., 1992; Dadds et al., 1992).

Much less is known about the parent-child processes that may contribute to childhood anxiety problems (e.g., Barrett, Rapee, Dadds, & Ryan. 1996; Dadds, Barrett, Rapee,
Ryan, 1996; Donenberg & Weisz, 1997), perhaps because anxiety is often combined with depression and conceptualized as part of the broadband internalizing domain. Similar to some aggressive children, anxious children are generally thought to have “authoritarian” mothers who are negative and punitive and show little warmth towards their children (Baumrind, 1971; 1991; Maccoby & Martin, 1983). There is some evidence that parents of anxious children excessively dominate and restrict their children (Krohne & Hock, 1991; Solyom, Silberfield, & Solyom, 1976). Also, Barrett and her colleagues (1996) showed that, in a problem-solving context, parents of anxious children seem to exacerbate children’s tendencies to choose avoidant solutions (also see Dadds et al., 1996). There also seems to be a significant genetic influence in the development of clinically elevated levels of anxiety (Rutter et al., 1990)

As a means of integrating the findings on different styles of parent-child interactions and their relation to childhood symptomatology, Dumas and colleagues (e.g., Dumas & LaFreniere, 1993; Dumas & LaFreniere, 1995; Dumas, LaFreniere, & Serketich, 1995; LaFreniere & Dumas, 1992) have proposed a transactional model based on the relative “balance of power” in the dyadic relationship. They suggest that with competent children, the balance favors the mother as she exerts most of the control over her child, but she also allows the child some practice in exercising his own positive and appropriate control strategies. In contrast, mothers of aggressive children do not exhibit appropriate control over their child’s behaviour; instead, their child has almost exclusive power in the relationship. Finally, with anxious children and mothers, the reverse pattern is evident, with the balance of power favoring the mother almost entirely. In addition to the relative balance of power, Dumas and colleagues have suggested that the predictability and the degree to which parents are discriminate in responses to children’s noncompliance is critical for a parsimonious account of different childhood psychopathologies. Specifically, unpredictable, indiscriminantly
positive parental responses to children's noncompliance leads to the development of childhood aggression, whereas predictably discriminate but intrusive and hostile parental behaviour leads to childhood anxiety.

In summary, a host of unique parent-child processes seem to be related to particular externalizing and internalizing childhood psychopathologies. But it is also important to keep in mind that many of these studies did not measure comorbidity in their samples. It is likely that studies focusing on externalizing children also included children who exhibited clinically significant internalizing problems, but these problems were not assessed. As a result, although most of the research reviewed was intended to speak to the family correlates of 'pure' externalizing or internalizing children, the samples may have been heterogeneous enough to include a significant proportion of MIXED children also. But apart from this potential conflation, what does this research indicate about children with co-occurring internalizing and externalizing symptoms? Do the parent-child relations of MIXED children resemble a combination of patterns found in families with single-syndrome children? Or do MIXED children exhibit entirely unique interaction patterns? These questions are difficult to answer given the paucity of studies that directly compare different clinical groups to one another.

Indeed, only a handful of studies have examined the possibility that unique parent-child processes may underlie the emergence of combined externalizing and internalizing symptoms (Capaldi, 1991; 1992; Capaldi & Stoolmiller, 1999; Dadds, et al., 1992; Donnenberg & Weisz, 1997; Sanders, et al., 1992). These studies were not exclusively concerned with the unique family processes of aggressive subtypes (MIXED and EXT), but they include data that can address the issue. All of the studies to be reviewed examined parent-child relations through the assessment of family problem-solving discussions. The strong rationale for this observational design is that interpersonal problem-solving skills have
repeatedly been shown to differentiate clinic-referred from non-referred children and adolescents and there is evidence that these skills are important in the treatment of aggressive youth (e.g., Borduin, Henggeler, Hanson, & Pruit, 1985; Dodge, 1985; Dodge, Pettit, McClaskey, & Brown, 1986; Kazdin, Esveldt-Dawson, French, & Unis, 1987; Kendall & Braswell, 1985; Robin, 1981).

As part of the Oregon Youth Study on at-risk youth, Capaldi (1991; 1992) explored the effects of depression on conduct-disordered children. She examined the parental characteristics and family processes that may differentiate boys with MIXED problems from boys with EXT problems alone. In terms of family management practices, the author found no differences between MIXED and EXT adolescents; both groups shared the same experiences of coercive and ineffective discipline and strong parental rejection. The only difference in parent-child relations between MIXED and EXT boys was in the perceptions of parents and their sons: MIXED children and their parents agreed that they did not get along well with each other, whereas EXT boys rated their relationship with their parents more favourably than their parents did. In a second follow-up study of this same sample in early adulthood, Capaldi and Stoolmiller (1999) found that MIXED, compared with EXT, young adults who had relationship difficulties with their parents in early adolescence were more likely to continue to experience these difficulties in young adulthood.

Most importantly, Capaldi’s studies showed small differences between MIXED and EXT children’s family processes in terms of their perceptions of the quality of their relationships, but overall, the findings suggest that similar parent-child relations for MIXED and EXT children related to poor long-term adjustment in both cases. These results support the claims of several authors (Goodyer, 1990; Rutter, 1989; Sines, 1987) who suggest that conduct problems and depression share similar family correlates; however, there are some limitations of this research that may have precluded finding larger differences. Perhaps the
most important is that the assessment of parent-child relations was on the basis of
questionnaires and global ratings of problem-solving discussions. These measures may have
been too coarse to pick up differences between families with pure externalizing versus
comorbid children.

Two studies by Dadds, Sanders, and their colleagues (Dadds, et al., 1992; Sanders, et
al., 1992) were also concerned with differences in the parent-child relations of clinic-referred
children; their data provided more fine-grained detail. In one study (Sanders et al., 1992), the
authors collected observational data in the lab on problem-solving discussions with families
of depressed, conduct-disordered, mixed depressed-conduct disordered and non-clinic
children. In the other study, the same four groups were assessed, but this time the
observations were collected at mealtime in the home. Not surprisingly, findings from both
studies indicated that all groups except for the non-clinic children showed poor interpersonal
problem-solving skills. The main difference between groups was that children with a CD-
only diagnosis showed the highest levels of aversive behaviour (almost twice as much)
compared to all other groups, including the MIXED group. In fact, the authors found no
differences between the overall levels of aversive behaviour of MIXED children and the non-
clinic children. MIXED children did, however, show elevated levels of depressed affect, not
observed in the CD-only group. Thus, in general, CD only children had family interactions
marked by aversive, angry affect compared to the MIXED group who showed a conspicuous
lack of hostility and, instead, showed elevated levels of depressed affect. The authors
concluded that “all three clinical groups are relatively ineffective at resolving family conflict,
[but] there are differences among the groups in how these deficiencies are expressed” (Dadds

Although both sets of studies observed problem-solving discussions, the findings of
Dadds, Sanders and colleagues largely contradict those of Capaldi (1991, 1992) and Capaldi
and Stoolmiller (1999) who found little difference between MIXED and EXT children’s
parent-child interactions. This disparity may be explained by differences in methodologies.
Dadds, Sanders, and colleagues did not use global rating scales of interactions as Capaldi did;
instead, they used a coding method in which, every 20 seconds, a negative or positive
behavioural code was recorded for both parent and child; these codes were tallied over the
entire session. This more fine-grained approach may have been more sensitive to previously
undetected differences between MIXED and EXT children.

A number of limitations in Dadds, Sanders and colleagues’ studies should be noted.
The first is one that the authors themselves acknowledge: among the main goals of the
studies was examining hostile reciprocity between family members. but frequency counts of
intervals in which aversive behaviours were observed may not have been the appropriate
measure. Instead, sequential analyses in which the interdependencies between parent and
child behaviours could be examined may have been preferable. A second limitation concerns
the relatively general coding system. The observational measures divided behaviours into
either “aversive” or “positive” parent, child, and sibling behaviours; in the Sanders et al.
study, the parent’s and child’s affect (angry or depressed) was also included. If these broad
negative and positive categories were further divided into more specific behaviours, and if the
sequential unfolding of these interpersonal behaviours was examined, an even more detailed
account of the differences between MIXED and EXT parent-child interactions could have
been captured.

A study conducted by Donnenberg and Weisz (1997) attempted to gather a more
detailed account of the differences in parent-child interactions between externalizing only,
internalizing only and MIXED children. They were interested in parsing the frequently used
global “positive” and “negative” behaviour categories into 16 finer distinctions that would
differentiate their three groups. The authors also wanted to assess differences in parent-child
relations between the three groups of families as a function of different contexts (conflictual problem-solving and planning a vacation). The main findings from this study suggested that, regardless of the group, parent-child interactions varied across contexts. Specifically, differences between groups were found in parental behaviour. For instance, parents of EXT children belittled and blamed their sons more in the conflict than in the planning task; in the planning task they did not differ from parents of non-aggressive children.

Unfortunately, Donnenberg and Weisz's (1997) results are not very helpful for understanding the differences between MIXED and EXT children specifically. They began by classifying children, on the basis of standardized cut-off scores on the Child Behaviour Checklist (Achenbach, 1991a), as either aggressive, depressed/anxious, mixed, or subclinical. Then, after presenting the means for all the behavioural codes in both tasks for each of the four groups, the authors proceeded to disregard these groups for all subsequent analyses. Instead, the authors followed an analytic strategy of transforming their theoretically distinct groups into two factors within an overall factorial design: Aggression (high versus low) and Depression/Anxiety (high versus low). Thus, the aggression-only group was redefined as high on aggression and low on depression and the mixed group was redefined as high on both factors. The justification for this procedure was that the factorial approach allowed for a test of the interactions between the two factors and other conditions (e.g., type of task). As a consequence, however, the authors were no longer testing differences among subtypes of disturbed children (case-based analyses); instead, they were testing associations between their variables (variable-based analyses).

Despite the limitations of Donnenberg and Weisz's study, their work is important for highlighting the role of context in problem-solving interactions. The importance of examining the variability in interaction patterns according to diverse contexts has been emphasized by many theorists in the past (Broyer, 1979, 1986; Cicchetti, 1993;
Dishion, French, & Patterson, 1995; Hinde, 1992; Pepler & Slaby, 1994; Sameroff, 1983, 1995; Sroufe, 1989, 1997), but there remains relatively little empirical work that systematically tests this variability.

1.6 Summary

Up to this point, I have argued that in order to better understand childhood aggression, and why treatment often fails with these youth, the intrinsic heterogeneity of aggressive children must be examined. Several approaches to identifying subtypes of aggression and aggressive children were outlined and it was suggested that one of the most promising strategies was to divide aggressive children into two subgroups: those with externalizing problems only and those with co-occurring externalizing and internalizing problems. A body of research suggesting that there are similar as well as some distinct risk factors and outcomes associated with each subtype was presented to provide an empirical rationale for examining potential differences between the two groups.

In the next section, I emphasized the lack of research on the underlying causal mechanisms that may lead to the co-occurrence of externalizing and internalizing symptoms. It seems particularly important to understand the potential parent-child relations that may be associated with this MIXED group, given the extensive body of literature that links distinct family processes to different childhood pathologies. The literature on the specificity of different parent-child processes to externalizing and internalizing problems was reviewed; but it was emphasized that there is very little known about how these processes differ for MIXED children. A small number of studies which examined whether MIXED and EXT children differed in their parent-child interactions was discussed in detail. Taken together, the findings from these studies seemed somewhat equivocal, with some suggesting differences and others suggesting similar processes. Moreover, there were some important
methodological gaps which may have limited the validity of those findings. Thus, it seems that the literature on the specificity of parent-child processes to subtypes of aggressive children remains largely speculative.

1.7 Gaps in previous research

Why is there so little information about the difference in family processes between aggressive subtypes? One reason may be that research on comorbidity in general is in its infancy (Capaldi & Stoolmiller, 1999; Caron & Rutter, 1991; Lilienfeld, Waldman, & Israel, 1994; Maser & Cloninger, 1990). Although the literature previously reviewed suggests that researchers with longitudinal and epidemiological data have begun to investigate co-occurring syndromes and their correlates, there is still much to be done. Most of the research has focused on risk factors and outcomes for children with comorbid disorders. Although risk factor research is clearly valuable and informative, it says little about what mechanisms form and maintain co-occurring syndromes. Given the state of affairs of comorbidity research in general, it is not surprising that there is so little work that compares the parent-child mechanisms underlying externalizing and mixed subtypes.

A second reason why there is so little known about the parent-child interactions associated with subtypes of aggressive children is that there are no studies that have explicitly set out to compare these interactions. Among the studies reviewed, most were concerned with depressed children and included externalizing children because they were a valuable comparison group, given the extensive literature on these families (Dadds et al., 1992; Sanders et al., 1992). Other studies were interested in comparing children with co-occurring aggression and depression for the purposes of understanding the added risk comorbidity represents compared to either problem alone (Capaldi, 1991, 1992). Without explicitly
testing hypothesized differences between subtypes of aggressive children, the findings from these studies can be regarded only as suggestive.

In addition, differences in parent-child interactions among subtypes of aggressive youth may not have been identified because most research does not pay attention to contextual influences. Although developmental psychopathologists generally acknowledge the importance of context on behavioural outcomes, according to The MacArther Foundation Research Network on Psychopathology and Development "context is often used as a form of jargon for anything environmental, as if invoking the term suggests compliance with current scientific and conceptual canons" (Boyce, et al., 1998, p. 145). An alternative approach is to regard all interpersonal relations as contextually constrained; thus, "contexts inherently imply contingencies" (Boyce et al., 1998, p. 146). It may be that to identify potential differences in subtypes' parent-child interactions, different contexts, and the dyadic contingencies that they imply, need to be systematically examined. In this way, "social contextual factors [can] help us to understand for whom, or under what conditions, a given outcome will hold" (Boyce et al., 1998, p. 146). Attention to the variability of behaviour given unique contexts has been a running theme for transactional theorists for decades (Bronfenbrenner, 1979, 1986; Cicchetti, 1993; Dishion et al., 1995; Hinde, 1992; Sameroff, 1983, 1995; Sroufe, 1989; 1997).

Another, perhaps more fundamental, reason for our lack of knowledge about subtypes and their family interactions may go back to most researchers' implicit assumption about the homogeneity of aggressive children. If homogeneity is the default theoretical position, then researchers tend to search for general causal principles that underpin aggression -- such as neglectful or hostile parenting (e.g., Goodyer, 1990) -- not the factors that may account for differences among these children. The homogeneity assumption may be even more prevalent among researchers studying the families of aggressive children: most studies and theoretical papers begin with the supposition that coercive family interactions underlie childhood
aggression. For many aggressive children this is surely a large part of the story and current interventions based on Patterson and colleagues’ coercion model are likely to have an impact on these children’s behaviours. But given the previously discussed variability in treatment success, it may be that individual differences in parent-child relations, lumped together as “coercive,” differentially predict both the process and outcome of treatment.

Although researchers generally disregard the variability of aggressive youth, a number of leading scholars have become concerned with highlighting this diversity and advocating the development of causal models that recognize the equifinality of aggression (e.g., Cicchetti & Richters, 1993; Hinshaw & Zupan, 1997; Moffitt, 1993). But the theoretical recognition of the importance of heterogeneity seems to have come to an impasse due to what Richters (1997) refers to as the “developmentalist’s dilemma” -- there is a disparity between developmentalists’ open systems models, which emphasize heterogeneity in developmental processes, and our mechanistic research methods, which are suited for closed, homogeneous systems. Several leading developmental theorists (e.g., Hinde, 1992; Kagan, 1992; Keating, 1990; Keating & Miller, 2000; Richters, 1997; Sameroff, 1983) have begun arguing for research methods that show greater fidelity to the basic heterogeneous nature of developmental phenomena. Most of our current research methods and analytic techniques (e.g., regression analyses, t-tests, path analyses) rely on strategies that aggregate overtly similar subjects into one group or another (e.g., aggressive and non-aggressive children) to conduct group-level statistical analyses. These factor analytic strategies, previously discussed in reference to Donnenberg and Weisz (1997), carry an *a priori* assumption of within-sample homogeneity. Several leading methodologists have argued that these assumptions seem to be unfounded and have likely led to misinterpretations of data (e.g., Hinshaw, 1999; Lykken, 1991; Meehl, 1978; Richters, 1997). DeKlyen and her colleagues recently summed up the problem:
“Previous studies have typically derived conclusions from scores averaged across subjects. Although such analytic strategies provide good information for homogeneous groups, if the population of interest is heterogeneous, these variable-oriented analyses will be inadequate (resulting in null findings or in contradictory outcomes from different samples). They cannot shed light on multiple pathways to disorder. Conduct problems appear to be multivariate in form and etiology, the equifinal outcome of multiple risk trajectories... Only analyses that maintain the integrity of the individual case (person-oriented analyses) will be able to identify varied pathways” (DeKlyen, Greenberg, Speltz, & Jones, 1999).

These authors and others have begun developing methods that focus on differences among clusters of cases rather than associations among various variables, but this work remains in its infancy. Thus, a final reason for our lack of knowledge about the parent-child relations of different subtypes of aggressive youth is the lack of research methods that are suited for the study of heterogeneous pathways.

1.8 Principles of self-organization in dynamic systems

In an attempt to resolve the mismatch between models of heterogeneous processes and methods appropriate only for homogeneous phenomena, developmentalists and social psychologists have begun importing dynamic systems (DS) or self-organization principles from the biological and physical sciences (Cicchetti & Rogosch, 1997; Deater-Deckard & Dodge, 1997; Fogel, 1993; Fogel & Thelen, 1987; Keating, 1990; Lewis, 1995, 1997; Lewis & Granic, 1999, 2000; Pepler, Craig, & O’Connell, 1999; Thelen & Smith, 1994; Thelen & Ulrich, 1991; Vallacher & Nowak, 1994; Vallacher & Nowak, 1997). For these theorists, principles of self-organization are powerful tools by which the heterogeneity of complex developmental systems can be better understood. The application of these same principles to the study of heterogeneous parent-child interactions may lead to the discovery of previously undetected differences in causal processes underlying subtypes of aggressive children.
Self-organization refers to the auto-organization or emergent order in complex, adaptive systems. Dynamic (or dynamical) systems (DS) theory is a technical language for studying the emergence and stabilization of novel forms in the process of self-organization (Prigogine & Stengers, 1984). For the purposes of this dissertation, I will be using DS terms metaphorically; that is, I am not suggesting that there are precise mathematical equations that can describe aggressive children’s parent-child relations. Instead, following other developmentalists (e.g., Fogel, 1993; Fogel & Thelen, 1987; Keating, 1990; Lewis, 1995, 1997; Pepler, et al., 1999; Thelen, 1995; Thelen & Smith, 1994; Thelen & Ulrich, 1991), I have found that the mathematical concepts have important heuristic value for conceptualizing development as self-organization. Rather than outlining the entire DS meta-theoretical framework, the following discussion is designed to highlight the most relevant principles for the current study.

1.8.1 Nonequilibrium

Self-organizing systems in nature are open systems far from thermodynamic equilibrium which are maintained through the constant importing and dissipating of energy. Non-equilibrium is the necessary condition for the spontaneous emergence and stabilization of novel forms. It is also this condition that makes self-organizing systems inherently adaptive to changes in their environment (Prigogine & Stengers, 1984).

1.8.2 Stabilization

Patterns of interactions or stable states are called attractors in DS terminology. They emerge through coupling, or cooperativity among lower order (more basic) system elements. Attractors may best be understood as absorbing states that “attract” the system. Behaviour self-organizes towards these attractors in real time. Over developmental time, attractors represent the recurrent patterns that have stabilized in the system. As recurring stable forms, attractors can be depicted topographically as valleys on a dynamic landscape. The deeper the
attractor, the more absorbing it is and, thus, the more resistant to small changes in the environment. As the system develops, a unique state space, defined as a model of all possible states a system can attain, is configured by several attractors.

Recurrent patterns of parent-child interactions can be conceptualized as dyadic attractors. The advantages of viewing social interaction patterns as dyadic attractors that emerge over development have been convincingly articulated by Alan Fogel and colleagues (e.g., Fogel, 1993; Fogel & Thelen, 1987; Fogel, et al., 1992). From this perspective, the parent-child dyad can be regarded as one system with unique properties that are irreducible to each individual member.

For example, Patterson, Snyder and their associates (e.g., Patterson, 1982; Snyder, et al., 1994) have discussed "coercive cycles" as aversive, mutually escalating patterns of interaction that recur over time. These cycles fit nicely with the definition of an attractor; however, reconceptualizing stable patterns as attractors has broader implications. Self-organizing systems have the potential to be drawn towards several attractors, depending on contextual constraints. Most research on aggressive parent-child interactions has focused exclusively on identifying either negative or positive patterns, but even severely aggressive dyads sometimes engage in positive interactions and the most healthy dyads have hostile arguments. Through a DS analysis, several unique interaction patterns can be examined concurrently and their relation to one another can be explored. Moreover, this sort of approach allows researchers to vary contextual constraints and observe resulting changes in interactional patterns (cf. Fogel, 1993; Thelen & Smith, 1994). This may be a particularly useful fine-grained strategy for identifying differences between subtypes of aggressive children and parents.
1.8.3 Feedback processes

Systems far from equilibrium self-organize through the interplay of two basic mechanisms: positive and negative feedback. Feedback processes have powerful implications for understanding stability and change in developing systems. Positive feedback is the means by which interactions among system elements amplify particular variations, leading to the emergence of novelty. New dynamic organizations emerge when small fluctuations become the conduit for energy flow through by way of positive feedback cycles. Negative feedback is the means by which elements continue to be linked and stability is realized (i.e., the system moves to its attractor). Self-organizing systems become increasingly complex through the interaction of both feedback processes; positive feedback catalyzes hierarchical reorganization in response to environmental changes and these new organizations are maintained through the self-stabilizing properties of negative feedback. These mechanisms of stability and change have been sufficient to explain phenomena ranging from self-maintaining cyclic chemical reactions (e.g., Prigogine & Stengers, 1984) to bullying episodes in the playground (Pepler et al., 1999) to evolution (e.g., Goerner, 1995); they may be equally suitable for understanding parent-child processes.

Feedback may be the mechanism by which characteristic dyadic states develop and crystallize. Certainly, recent reconceptualizations of bidirectional processes in parent-child relations as circular and recursive resonate well with this notion (e.g., Maccoby, 1992). Several investigators in the field have recognized the importance of feedback to describe dyadic processes (e.g., Maccoby & Martin, 1983; Patterson, 1982; 1995; Pepler et al., 1999; Schore, 1997; Wilson & Gottman, 1995; see Granic, 2000, for a review). For instance, Cairns (1979, in Maccoby & Martin, 1983) suggested that the "continuing reverberations" of mutual influences between dyad members can be understood as feedback in real time. Likewise, Patterson specifies the role of feedback in coercive family processes: "the child is an active
participant whose behaviour is a reaction to the behaviour of the other family members and also constitutes a stimulus for their behaviours. A behavioural event is an effect and a cause...” (Patterson, 1982, p. 196).

1.8.4 Interdependent time scales

Another important DS premise is the interplay between different time scales of self-organization. Self-organization at the moment-to-moment (real time) scale constrains self-organization at the developmental scale which, in turn, constrains real time behaviour (van Gelder & Port, 1995). The notion of interdependent time scales suggests that developmental parent-child patterns arise from real-time interactions that recur. As these patterns are continuously re-experienced over occasions, they can be represented as deeper and deeper attractors on a dyadic state space. This increasingly specified dyadic state space can be said to express the history of the system (cf. Thelen & Smith, 1994) and, as such, it constrains the types of real-time interactions in which the dyad will engage. In other words, based on prior experience, the likelihood of a parent and child interacting in a particular manner is increasingly predetermined.

1.8.5 Discontinuous change

The final and perhaps hallmark principle of self-organizing systems is their tendency to exhibit discontinuous, or nonlinear, change. Because these systems exist far from equilibrium, they can be extremely sensitive to small fluctuations (or perturbations) in contextual constraints. Through the amplification properties of positive feedback, these small fluctuations have the potential to disproportionately affect the status of other elements in the system, leading to the stabilization of new forms or patterns – a principle often referred to as the “butterfly effect.” Fluctuations, or perturbations, do not have to originate from outside the system; they can emerge spontaneously through feedback within the system. The way in which the real-time behaviour of a system becomes reorganized in response to small
perturbations depends upon its underlying structure. Thus, DS researchers are chiefly concerned with observing changes in system behaviour as it varies with shifts in contextual forces (e.g., Fogel, 1993; Lewis & Granic, 1999; Thelen & Smith, 1994; Thelen & Ulrich, 1991).

The basic DS tenet that all behaviour is context-dependent resonates well with the transactional perspective (Brofenbrenner, 1979, 1986; Cicchetti, 1993; Hinde, 1992; Sameroff, 1983a, 1983b; Sroufe, 1989; 1997) which emphasizes the individual-environment interdependencies underlying behavioural outcomes. But the DS framework further suggests particular methodologies for examining differences in the interaction patterns of aggressive dyads. According to DS principles, the best way to tap underlying structural variability is by perturbing the parent-child system – and, thus, potentially changing contextual contingencies -- and observing its re-organization in response.

1.9 Rationale for Present Study

Subtyping aggressive children based on whether or not they also exhibit clinically elevated levels of internalizing problems has been considered a useful way of parsing this heterogeneous group. But despite its merit, there has been very little research on the differences in causal processes that may underlie the development of EXT versus MIXED children. Earlier in this chapter, it was suggested that these differences may be grounded, in part, in parent-child interactions. Only a handful of studies have examined the differences in EXT and MIXED family interactions, and even those were not designed with the explicit purpose of comparing subtypes of aggressive youth (e.g., Capaldi, 1991, 1992; Dadds et al., 1992; Sanders et al., 1992). Moreover, results from these studies were equivocal in terms of the nature of the differences that were found. But it may be that the structural differences between subtypes’ parent-child relations have not been established because no studies have
attempted to perturb the interaction patterns that have stabilized. From a DS perspective, by perturbing the dyadic system, contextual constraints may change enough to catalyze a major re-organization towards a different attractor – an attractor that may not have otherwise been identified.

Two phases, a pilot and a hypothesis-testing phase, were included in the current study. The study was designed to compare MIXED and EXT children’s parent-child interactions and to identify different patterns based on dyads’ behavioural responses to a perturbation. Based on extensive research at the Oregon Social Learning Center and many other sites (e.g., Baumrind, 1971; Dumas & LaFreniere, 1993; Dumas & LaFreniere, 1995; Dumas, LaFreniere, & Serketich, 1995; LaFreniere & Dumas, 1992), it was clear that most dyads, regardless of subtype, would engage in a permissive dyadic style (i.e., the parent was expected to respond positively or in a neutral manner to the child’s hostile behaviour). Studies have also consistently found mutual hostility to be a common pattern among aggressive dyads (e.g., Patterson, 1982; Patterson, et al., 1992; Snyder et al., 1994; Snyder, et al., 1997); thus, it was likely that this interaction style would also emerge in the present study. But the primary goal of the study was not to replicate well-established findings that show that aggressive dyads engage in these types of interactions. Rather, the focus of the present study was on changes in these expected patterns in response to small changes in the context. Informed by DS principles, it was the re-organization of dyadic patterns that was expected to differentiate MIXED and EXT parent-child interactions.

In the present study, parent-child interactions were assessed through the most common laboratory method employed with aggressive families – observations of problem-solving discussions (e.g., Capaldi, 1991; 1992; Capaldi & Stoolmiller, 1999; Dadds, et al., 1992; Donnenberg & Weisz, 1997; Sanders, et al., 1992). As argued earlier, the rationale for assessing family problem-solving patterns is strong. It is generally acknowledged that the
best way to examine differences in parent-child interactions is to assess these patterns in emotional situations, particularly those that are likely to elicit negative emotions (e.g., Donnenberg & Weisz, 1997). Problem-solving patterns have been shown to differentiate clinic-referred from non-referred children, as well as to distinguish among children with different psychopathologies; the development of problem-solving skills may also be critical in the treatment of aggressive youth (e.g., Borduin, et al., 1985; Dodge, 1985; Dodge, et al., 1986; Kazdin, et al., 1987; Kendall & Braswell, 1985; Robin, 1981).

The current study used an identical approach to the studies reviewed previously with one critical change – a perturbation was introduced part-way through the problem-solving session in order to examine the stability of the observed patterns. This DS-based design innovation was intended to increase the pressure on dyads to resolve the conflict quickly and amiably; thus, the “emotional ante” was raised. The procedure was intended to mimic similar naturalistic episodes in which one or both partners suddenly feels the urgent need to resolve a particular conflict. This type of increase in pressure may come from very minor changes in the environment, or from dyad members’ own internal changes. For instance, parents often start feeling embarrassed in a public place (e.g., bank, supermarket) when an argument begins to escalate and they are unable to control their child. Children may also feel similar pressures to resolve conflicts when they are expecting a friend to visit or when a much-loved television show is about to start and they are unable to end a discussion amiably. Again, it was dyads’ behavioural response to this kind of small-scale perturbation that was of central interest in the present study.

Principles of dynamic systems were integral not only to the design of the current study, but also to the analytic methods that were employed. An exploratory method was needed that could represent dyadic behaviour as it unfolded in real-time; a method that could depict several dyadic states at once and the movement from one state to another. Given the
transactional nature of parent-child interactions, it was also important to find a tool that could capture behaviour on both an individual level and a dyadic one. Thus, state space grids (Granic, 1999; Lewis, Lamey, & Douglas, 1999), a dynamic systems method that graphically represents real-time behaviour as it proceeds, were adapted for the current study.

1.10 Overview of Design

The first phase of the study served as a pilot study which was partially exploratory, designed to generate hypotheses. The study as a whole was guided by the general expectation that dyadic subtypes would be differentiated on the basis of their response to a perturbation – this hypothesis was implicit in the experimental design. But it was important to include a preliminary hypotheses-generating phase because, given the paucity of relevant past research, it was difficult to formulate any content-specific hypotheses. It was unclear if both types of dyads would shift interaction patterns, and if they did, the nature of these changes was unknown. The second phase served to replicate the findings from the first and to extend previous findings with more rigorous tests of fine-grained hypotheses.

The study focused exclusively on boys' interactions with their mothers for a number of reasons. First, there were very few girls referred for treatment at the clinic from which participants were recruited; thus, there was not enough power to allow for the exploration of gender differences in parent-child interactions. Also, there are strong theoretical reasons and empirical evidence that suggest that there are distinct causal mechanisms underlying the development of aggression for boys versus girls (e.g., Crick, et al., 1999). Fathers were excluded from the study because only a small minority of families that participated in the study had fathers living in the home.

The experimental procedure was identical in both phases of the study. Parents and children engaged in a 6-minute discussion about an area of conflict that both members
nominated as highly problematic. After 4 minutes, the dyad heard a knock on the door which they were told was the signal to try to quickly finish their discussion and end on friendly terms – this was the standardized perturbation. The knock on the door was designed to perturb the dyad by increasing the pressure to 1) resolve the conflict quickly and 2) to end in an affectively positive state. It was expected that subtypes’ parent-child interaction patterns would look similar before being perturbed and only in response to the perturbation would subtypes become differentiated (see Figure 1.1).

Figure 1.1 Design of the study
CHAPTER 2

Phase 1 – Pilot

2.1 Objectives

The present study was divided into two phases: a piloting or hypotheses-generating phase, and a hypotheses-testing phase. There were three objectives to the current phase. The first was to test the general prediction that subtypes of aggressive youth differed in their parent-child problem-solving interactions. These differences were expected to appear based on dyads' behavioural reorganization in response to a perturbation. It was difficult to formulate hypotheses about the nature of these differences because there were so few studies that specifically compared the problem-solving interactions of 'pure' externalizing children to those of mixed externalizing and internalizing children. It was also difficult because the studies which did compare problem-solving interactions with MIXED and EXT youth did not attempt to systematically perturb these sessions to examine the stability of dyadic patterns.

In the past, research has shown that aggressive dyads tend to exhibit two types of interaction patterns: a permissive pattern in which the parent responds positively or in a neutral manner to the child's negative behaviours and a mutually hostile pattern. But it was unclear when these patterns would emerge in the interaction, if positive or neutral patterns would also be evident, whether these patterns would change as a result of the perturbation, and whether subtypes would differ in terms of the content and form of these interactions. Thus, the second, related objective was to search for particular differences in both the content (i.e., types of attractors) and the organization of dyadic behaviour (i.e., flexibility/rigidity of attractors) for the purposes of generating hypotheses for the second phase of the study.

The third aim was to develop analytic strategies that could be combined with conventional techniques to examine discontinuous, real-time processes -- processes of central
interest in this study. These strategies needed to be flexible enough to retain the integrity of
individual cases (or dyads) and to be appropriate for examining differences between clusters
of cases. It was also important to find a method that did not necessitate collapsing across
time and context. In short, the goal for this piloting phase was to move towards developing
analytic strategies that were more commensurate with principles of dynamic systems.

2.2 Research Questions

Three research questions were examined in the current study:

1. Do subtypes of aggressive children differ in their parent-child problem-solving
   interactions?
2. Can these structural differences be detected by using the standard family problem-solving
   paradigm, or are they better accessed by perturbing the interaction and observing dyads'
   behavioural responses?
3. If dyads change their behavioural habits after the perturbation, what is the specific nature
   of this change for each subtype?

2.3 Definition of Terms

Attractor

In this study, an attractor refers to a stable (but not static) pattern of parent-child
interaction. It is the pattern, or patterns, of interaction that the dyad frequently tends to be
drawn towards. Dyadic attractors are assumed to have stabilized over development through
many similarly experienced occasions. One example relevant to this study is the permissive
attractor in which the mother regularly responds positively or warmly to her child’s negative
behaviours. Another example is the mutually hostile attractor in which both partners act and
react with hostility and criticism.
Phase Shift

Based on DS principles, the best way to tap structural differences between dyads is by perturbing the dyadic system and observing it reorganize in response. This re-organization is referred to as a phase shift because it is assumed to be abrupt or discontinuous. The perturbation in this study was a knock on the door during the parent-child problem-solving discussion. The knock was designed to perturb the dyad by increasing the pressure to 1) resolve the conflict quickly and 2) to end in an affectively positive state. It was the dyads’ adjustment to this perturbation that was of central interest in this study.

2.4 Methods

2.4.1 Participants

Parents and children were recruited from an outpatient group treatment program for aggressive children based in an urban psychiatric institute. Child participants were 13 boys between 8 and 12 years of age, referred to the program by either a mental health professional, teacher, or by the parent. Mothers of referred children also participated in the study. To be included in the study, boys had to score within the clinical or borderline-clinical range (95th percentile) on the Externalizing subscale of either the Child Behaviour Checklist (CBCL; Achenbach, 1991a) or the Teacher Report Form (TRF; Achenbach, 1991b). Mothers and children needed to have sufficient command of the English language to complete questionnaires without an interpreter. The child had to be currently living with the mother and to have been in the home for at least one year prior to the assessment. Children were excluded if they were diagnosed as mentally handicapped or if they had a pervasive developmental disorder. Children were classified into 2 distinct groups based on a combination of information from the CBCL and TRF. At least one of the two available sources of information had to reach borderline or clinical cutoffs for a diagnostic criteria to
apply. This simple combinatorial strategy has been shown to approximate best-estimate diagnoses made by clinicians (e.g., Bird, Gould, & Staghezza, 1992) and to be just as effective as more elaborate strategies, including logistic regression techniques (e.g., Loeber et al., 1990; see Offord et al., 1996, for a review).

2.4.2 Classification Criteria

'Pure' Externalizing. To qualify for the 'pure' externalizing group (EXT), children were required to score at or above the borderline clinical cut-off ($T \geq 67$) on the Externalizing scale of either the CBCL or the TRF, and to score below this cutoff on the Internalizing scale on both the CBCL and TRF.

'Mixed' Externalizing and Internalizing. Children qualified for the mixed group (MIXED) if they scored at or above the borderline clinical cut-off ($T \geq 67$) on the Externalizing scale of either the CBCL or the TRF and scored above this cutoff on the Internalizing scale on either the CBCL or TRF.

Using these criteria, 6 children were classified as EXT and 7 were classified as MIXED. Means and standard deviations of the Externalizing and Internalizing $T$-scores on the CBCL and TRF are presented for each group in Table 2.1.

Table 2.1 Group means and standard deviations on CBCL and TRF scores

| Measure | Externalizers | | | Mixed | |
|---------|--------------|----------------|----------------|----------------|
|         | $M$          | $SD$          | $M$          | $SD$          |
| CBCL    |              |              |              |              |
| Externalizing | 70.67 | 5.07 | 73.29 | 8.32 |
| Internalizing | 54.17 | 10.07 | 73.57 | 5.62 |
| TRF     |              |              |              |              |
| Externalizing | 67.33 | 7.90 | 70.86 | 7.20 |
| Internalizing | 51.83 | 5.35 | 69.29 | 12.76 |
2.4.3 Procedure

The experimenter met with each parent and child approximately two weeks prior to the beginning of a treatment program and explained the procedure (the current study was not part of the treatment program). Both parent and child gave written consent to participate in the study (see Appendix A and B). An additional consent form was signed by the parent indicating she agreed to have her son and herself videotaped. The form also stipulated that the videos would be used for data collection and could only be shown for educational and professional purposes (see Appendix C).

Participants were told that they would engage in two separate problem-solving sessions. All the instructions for the interaction were provided before the first interaction and repeated before the second. Before this, the parent and child completed a modified version of the Issues Checklist (Robin & Weiss, 1980) which lists a number of potential sources of conflict between parents and children (e.g., bed time, lying, swearing). The experimenter chose two issues from these questionnaires for the problem-solving sessions -- one rated by both parent and child as moderately problematic and one rated as highly problematic.

Interactions were videotaped from behind a one-way mirror and coded for specific emotions and content using modified versions of standardized coding systems (described in detail later). In addition, parents and teachers were asked to complete standardized measures of children’s problem behaviours. These instruments assessed the severity of externalizing and internalizing symptoms according to multiple informants (i.e., parents and teachers) in different settings (i.e., school and home). Basic demographic information (e.g., age of child and parent, grade, marital status) was also collected from the parent.
2.4.4 Measures

Problem Behaviour

Child Behavior Checklist (CBCL; Achenbach, 1991a). The CBCL (see Appendix D) is a standardized, highly reliable and valid measure of children’s emotional and behavioural problems. Parents are asked to indicate whether, and to what degree, their child exhibits a list of symptoms. The instrument yields standardized T-scores for Total Behaviour Problems, Internalizing Problems and Externalizing Problems, as well as subscale T-scores for the narrowband scales: Withdrawn, Somatic Complaints, Anxious/Depressed, Social Problems, Thought Problems, Attention Problems, Delinquent Behaviour, Aggressive Behaviour and Sex Problems. For the purposes of the current study, only the standardized broadband Externalizing and Internalizing T-scores were used.

Teacher Report Form (TRF; Achenbach, 1991b). The TRF (see Appendix E) is a parallel measure to the CBCL that is completed by the child’s teacher. It is also a standardized, highly reliable and valid measure and generates the same broadband T-scores as the CBCL. Again, only the Externalizing and Internalizing scales were used.

Issues Checklist (Robin & Weiss, 1980). A slightly modified version of the Issues Checklist (see Appendix F) was included to assess the most frequently and intensely discussed family issue, according to the parent and child. The original version of this questionnaire was designed to be relevant for adolescents and parents; it included 44 items of potential conflict. For the present study, some of the items that related primarily to adolescent issues were deleted or replaced with more appropriate items for 8 – 12 year-olds (e.g., “going on dates” was replaced with “talking back to teachers” and “sex” and “drugs” were deleted). Parents and children were asked to recall disagreements about several issues including lying, bed-time, and so on, and to report the frequency and intensity of these discussions (on a five-point Likert scale). For each item, the frequency score was multiplied
by the intensity value and the topic with the highest frequency by intensity product on both
the parent and child forms was chosen for the second discussion. If there were any
discrepancies (i.e., if the parent chose a high conflict topic which was rated as low conflict
for the child), the parent’s high conflict topic was chosen. For the first discussion, a topic
that dyad members agreed was moderately conflictual was chosen -- one that was not rated as
the lowest or highest intensely discussed area on either participant’s checklist.

*Parent-Child Interactions*

Dyads were observed in the clinic during two standardized problem-solving
discussions. Interactions were videotaped behind a one-way mirror. For the first problem-
solving interaction, dyads discussed an issue from the Issues Checklist that both participants
ominated as moderately problematic. For the second interaction, dyads discussed an issue
that both partners agreed was one of their most problematic. The first interaction was
designed as a practice session, to allow dyads to become accustomed with the task. The
second was intended to be more emotionally arousing and, for most dyads, it was this session
that was later analyzed. For one dyad, the first interaction turned out to be the most
conflictual and emotional; the first session was analyzed instead of the second in this case
(further details about how these decisions were made are discussed in the preliminary data
analysis section).

Dyad members were asked to interact naturally, to speak to each other and not to the
camera, and to avoid feeling compelled to explain events to the experimenter (or the camera).
The parent and child were then told to face each other and discuss, with the intent to resolve,
the first issue. They were told that they would have 6 minutes to try to resolve the conflict
and that after 4 minutes, they would hear a knock on the door (the perturbation). They were
told that the knock was their signal to try to “wrap up, resolve the conflict for good, and end
on friendly terms.” The procedure was repeated immediately with the second topic.
### 2.4.5 Coding System

Interaction sessions were coded using slightly modified versions of standardized coding systems, one for affect and another for content (i.e., problem-solving strategies). Each turn of conversation was assigned one affect and one content code. Variables were coded separately to avoid confounds that may occur from the same rater coding both affect and content. Interaction sessions were coded in three steps: 1) each conversational turn was transcribed verbatim, 2) each transcribed turn was coded for its content without referring to the videotapes and using the transcription instead, and 3) the affect that accompanied each turn of speech was coded directly from the videotapes by a second rater.

**Affect codes.** Affect was coded according to a variation of Snyder, Schrepferman, and Peter's (1997) system. The only variation in the current scheme was that affect was coded independently of the statements that accompanied it. The coding scale was as follows: 1 = exuberant positive affect (e.g., laughing), 2 = positive affect (e.g., smiling), 3 = neutral affect, 4 = negative affect (e.g., sarcastic tone of voice) and 5 = unrestrained negative affect (e.g., yelling). Codes were based on global impressions of the tone of voice, body posture and facial expression accompanying each verbal utterance. The coder was instructed to disregard the content of the verbal statements and focus exclusively on non-verbal cues.

**Problem-solving strategies (Content codes).** This content-oriented system was a combination of Robin & Weiss’ (1980) modification of the Marital Interaction Coding System and Snyder and colleagues’ (1994) ordinal scale for coercive behaviour. Their coding system was modified slightly (6 more behaviours were included). The current system classified 16 verbal behaviours into one of five categories ordered on a continuum ranging from 1 = very positive problem-solving strategies, through 3 = neutral, to 5 = very negative strategies. Videotapes were transcribed verbatim and each turn of conversation (parent and
child) was assigned one of the 16 codes. All the codes with examples of each are provided in Table 2.2.

2.4.6 Observers and Reliability

Two undergraduate students and I were involved in coding the videotaped interactions. The two students were blind to the purposes of the study. One student was responsible for transcribing all the discussions verbatim. The second student was responsible for coding affect, and I coded the transcribed discussions for problem-solving strategies (content). I trained the second coder who coded affect until we reached over 90% agreement. The training was conducted on pilot data collected the previous year; these data were not included in the present study. Due to the lack of resources and the exploratory nature of this study, no formal reliability checks were made after the training period, but there are good reasons to believe reliability was maintained at acceptable levels. First, there were more than 20 hours of training and practice with the rating system before coding procedures on the current data began. Second, the coding took place in a span of only 3 weeks, immediately after training occurred; thus, criterion drift was likely minimized. In the second phase of the study, interrater reliability was computed statistically for the current pilot data and the second phase data combined; reliability was found to be adequate across this full sample (see Observers and Reliability section in Chapter 3).

2.4.7 Data Transformations

The affect and content of each conversational turn was coded separately and subsequently collapsed into one composite code. The procedure for collapsing codes was as follows: (1) The 16 content codes were combined to form 5 codes that fell on a continuum from 1 (Very Positive) to 5 (Very Negative). The particular codes that were grouped together are shown in the first column in Table 2.2 (2) The affect and recoded content scores were combined to form one “affective content” continuum from 1 (Very Supportive) to 5
Table 2.2 Problem-solving Content Coding System

<table>
<thead>
<tr>
<th>Positive / Negative</th>
<th>Problem-solving Strategy</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Positive</td>
<td>approving or supportive comment</td>
<td>&quot;You did great last week!&quot;</td>
</tr>
<tr>
<td>(1)</td>
<td>direct agreement / compliance</td>
<td>&quot;You’re right.&quot; or &quot;I will.&quot;</td>
</tr>
<tr>
<td></td>
<td>offering an opinion</td>
<td>&quot;I think you may want to go&quot;</td>
</tr>
<tr>
<td>Positive</td>
<td>eliciting an opinion</td>
<td>&quot;What do you think?&quot;</td>
</tr>
<tr>
<td>(2)</td>
<td>assent / affirmative</td>
<td>&quot;Yeah&quot; or &quot;O.K.&quot;</td>
</tr>
<tr>
<td>Neutral</td>
<td>exchange of information/clarification</td>
<td>&quot;That was last Saturday.&quot;</td>
</tr>
<tr>
<td>(3)</td>
<td>summarizing other</td>
<td>&quot;So you didn’t like being there.&quot;</td>
</tr>
<tr>
<td></td>
<td>request for clarification or question</td>
<td>&quot;How many times did you go?&quot;</td>
</tr>
<tr>
<td></td>
<td>request for compliance</td>
<td>&quot;Try to stop acting for the camera.&quot;</td>
</tr>
<tr>
<td>Negative</td>
<td>disagreement</td>
<td>&quot;No, because you’re too young.&quot;</td>
</tr>
<tr>
<td>(4)</td>
<td>&quot;yes but&quot; agreement</td>
<td>&quot;Yes, but all my friends get to do it.&quot;</td>
</tr>
<tr>
<td></td>
<td>command</td>
<td>&quot;Get over here right now.&quot;</td>
</tr>
<tr>
<td>Very Negative</td>
<td>non-compliance</td>
<td>&quot;You can’t make me do it.&quot;</td>
</tr>
<tr>
<td>(5)</td>
<td>complain/ accuse</td>
<td>&quot;You never listen.&quot;</td>
</tr>
<tr>
<td></td>
<td>criticize/ insult</td>
<td>&quot;You’re so lazy in the morning.&quot;</td>
</tr>
<tr>
<td></td>
<td>threaten</td>
<td>&quot;You do or else you’ll never see that game again.&quot;</td>
</tr>
</tbody>
</table>

(Very Coercive). If the value for both content and affect were the same for a particular turn, the same value would simply be assigned for the combined code. If there was any discrepancy between affect and content, codes were combined by weighing discrepant scores
towards the affective valance. For example, there were instances of sarcasm in which a child would mock his mother (e.g., "Yeah mom, that really worked well."). In these cases, affect was assigned a code of 4 (negative) and the content was coded as "agree" (code 1; very positive); the collapsed coded was a 4 (negative), weighed in favour of affect. If either affect or content was neutral and the other was not, the value of the non-neutral code was assigned.

Sequential analyses were conducted using Bakeman and Quera’s program, GSEQ for Windows (Version 3.6, January 2000). State space grids were generated in SPSS’ graphics package.

2.4.8 Operationalization of Variables

Two main parent-child interaction patterns were assessed: permissiveness and mutual hostility. As discussed in the Introduction and summarized in the Rationale (p. 32) extensive past research led to the expectation that most dyads, regardless of subtype, would engage in a permissive dyadic style. Mutual hostility was also a common pattern found among aggressive dyads. Patterns were operationalized as follows:

Permissiveness. All instances of child “negative” and “very negative” codes were identified. A sequence was defined as permissive if the parent responded immediately (i.e., in the next conversational turn; lag 1) to the child’s “negative” or “very negative” behaviour (i.e., codes 4 or 5) with a “neutral,” “positive,” or “very positive” behaviour (i.e., 1, 2, or 3).

Mutual Hostility. All parent and child “very negative” codes were identified. A sequence was defined as mutual hostility if the next conversational turn (i.e., lag 1) was also coded “very negative.” Thus, either parent or child could initiate this sequence.

2.5 Analyses and Results

The current study examined the relation between subtypes of aggressive children and characteristic behavioural changes after a perturbation to the parent-child system. Past
research led to the expectation that the majority of dyads would tend towards at least two types of attractors: a permissive one, in which the parent would respond positively or in a neutral manner to the child’s negative behaviours, and a mutually hostile attractor. The analyses were aimed at examining when these patterns emerged in the interaction, whether they changed as a result of changing the context slightly (i.e., after the perturbation), and the relation between these changes and aggressive subtypes. Both state space grid (Lewis, et al., 1999) and sequential analyses (Bakeman & Gottman, 1997) were employed.

2.5.1 Preliminary Analyses

Two dyads were eliminated from further analyses because they were unengaged in the task. Specifically, one dyad decided to ignore the instructions and play their own game in which the mother and child switched roles and tried to act as the other often does in problem-solving situations. The other dyad changed the topic of conversation for both problem-solving sessions and discussed soccer instead. Both children who were eliminated were classified as MIXED.

For the remaining 11 dyads (6 EXT and 5 MIXED), analyses were conducted to ensure that groups did not differ on the demographic variables. Two one-way ANOVAs were performed to ensure that there were no systematic differences between groups in mother’s age and child’s age. Chi-square analyses were performed on three categorical variables: (1) ethnicity, (2) mother’s highest level of education, and (3) parent’s marital status. No significant differences were found on any of these comparisons.

To ensure that analyses were run on the most emotionally arousing session, a manipulation check was conducted for each dyad, comparing the first and second problem-solving sessions. As discussed earlier, the first session was intended to be a practice session to get dyads accustomed to the exercise and to being videotaped; it was the second session that was intended for analyses. But for various reasons (e.g., the topic was one the dyad had
just spoken about earlier in the day, one or both dyad members were in a bad mood when
beginning the exercise) it was possible that some dyads could have become more emotionally
involved with the first issue than the second. Thus, the frequency of “negative” and “very
negative” codes (codes 4 and 5) was calculated separately for each dyad and each session.
For all dyads but one, the frequency of negative codes was higher in the second session than
the first. For this anomalous dyad, the first session was analyzed instead.

2.5.2 State Space Grid Analyses

A variation of Lewis and colleagues’ (1999) state space grids was constructed for
each dyad (for examples, see Figures 2.1 – 2.5). Inspired by a DS framework, these grids
offer an intuitively appealing way to view the real time unfolding of complex, interactional
behaviour. By displaying how behaviour clusters in certain regions, this method provides a
graphical means by which attractors, and changes in these patterns, may be identified. The
grids function similarly to conventional scatterplots in that they provide the researcher with a
straightforward snapshot of relations between variables. But state space grids have the
additional advantage of representing time along a trajectory; thus, this method can capture
dyads’ move towards a particular attractor, the de-stabilization of that pattern, and the
behavioural reorganization towards another attractor. For this study, state space grids were
particularly useful as an exploratory tool, to provide an impression of the observational data.
Following this phase of the analyses, the impressions gained from the state space grids were
statistically tested through sequential analysis.

Figure 2.1 shows a state space grid with a hypothetical trajectory representing 10
conversational turns. The following 10 codes were plotted (c = child, p = parent): c_3, p_3,
c_4, p_3, c_4, p_2, c_5, p_5, c_5, p_4. The y-axis of the grid represents the child’s
behaviour at lag 0 and the x-axis represents the parent’s behaviour that followed (lag 1).
Given that the permissiveness pattern was of central concern in the current study, it was
decided that the parent's behaviour should be represented at lag 1; as operationalized earlier, this pattern represents the parent's response to the child's behaviour (i.e., child 4 or 5 → parent 1, 2, or 3). Region A represents the permissiveness pattern (child 4 or 5 → parent 1, 2, or 3). Region B represents the mutual hostility pattern (child 4 or 5 → parent 4 or 5). For each dyad, the point representing each two-event child → parent sequence was plotted on a grid and a trajectory was drawn to connect them.

![Hypothetical state space grid with ten conversational turns plotted.](image)

**Figure 2.1** Hypothetical state space grid with ten conversational turns plotted.

State space grids were constructed for all dyads in the study. In order to construct these grids using SPSS (and to avoid constructing them all by hand), each parent and child
code (codes 1 – 5) was multiplied by a small random number. This was done so that points that were meant to fall in the same cell were randomly distributed in the space within that cell; this made it easier to visualize the number of points within a cell. For the purposes of the current study, the trajectory is not as important as noting the cells in which behaviour tends to cluster.

Visual inspection of these state space grids showed differences between types of dyads. Specifically, the state space grids showed that dyads with EXT children (exemplified in Figures 2.2 and 2.3) appeared to be drawn towards several regions before the perturbation. These patterns can be characterized as permissive, mutual hostility and mutual neutrality. In response to the perturbation, however, these dyads moved almost exclusively towards the permissive region. MIXED dyads (exemplified in Figures 2.4 and 2.5) showed similar patterns before the perturbation, but in response to the perturbation, these dyads moved away from the permissive region towards the mutually hostile region of the state space grid. Thus, it seemed that EXT dyads remained mostly in the permissive pattern, even after the perturbation to the system. This pattern was in contrast to the MIXED dyads for whom the perturbation seemed to induce the dyad to move from the permissive pattern to a mutually hostile one instead.

2.5.3 Sequential Analyses

To complement and quantify the results found through the graphical approach, sequential analyses were conducted. From the state space grid analyses, it appeared that both EXT and MIXED dyads engaged in a permissive pattern before the perturbation, but after the perturbation, MIXED, and not EXT dyads, tended to change to a mutual hostility pattern. Another way to frame the state space grid results is to say that, for EXT dyads, the probability of engaging in the permissiveness pattern stayed the same after the perturbation;
whereas for MIXED dyads, the probability of engaging in the same pattern decreased after the perturbation. To test these impressions with sequential analyses, several steps were taken.

The first step in the analyses was to identify all incidences of child negativity (code 4 or 5) and compute the conditional probability that the parent would respond immediately (lag 1) with a positive or neutral behaviour (code 1, 2, or 3); this conditional probability represented the permissiveness probability. For example, if a child was negative 10 times and out of those 10 times, the mother responded with positive or neutral behaviours 4 times and with negative behaviours 6 times, then the permissiveness conditional probability was .40. Conditional probabilities were computed separately before and after the perturbation, for each dyad. In the next step, dyads were assigned one of two categorical codes depending on whether their permissiveness probability (1) increased or stayed the same after the perturbation or (2) decreased after the perturbation. Thus, if the permissiveness probability for one dyad was .40 before the perturbation and .10 after, this dyad would be assigned a code of “2,” indicating that their permissiveness probability decreased after the perturbation. For the final step, the Pearson chi-square statistic was computed to compare MIXED and EXT dyads with respect to decreasing versus increasing/same permissiveness probabilities. Results revealed a significant association, $X^2 = 4.95$ (1), $p < .03$, with MIXED dyads showing a pattern of decreasing permissiveness after the perturbation and EXT dyads showing increasing/same permissiveness.

A similar analytic strategy was planned for testing changes in the probability of engaging in mutually hostile sequences. However, these analyses were not carried out because of the relatively small number of data points available. In sequential analysis, conditional probabilities become increasingly reliable as the base rates of the target behaviours increase (Bakeman & Gottman, 1997; Bakeman, Adamson, & Strisik, 1995). In this first phase of the study, the base rate for parents' hostility was too small when the
problem-solving session was divided into two periods to get a meaningful estimate of conditional probabilities and their profile of change (11% of the codes pre-perturbation and 5% post-perturbation were hostile).
Figure 2.2 Dyad #4 before the perturbation

Figure 2.3 Dyad #4 after the perturbation
Figure 2.4 Dyad #7 before the perturbation

Figure 2.5 Dyad #7 after the perturbation
2.6 Discussion

The findings from the first phase of the study revealed differences between problem-solving interactions of EXT and MIXED children and parents. As hypothesized, these differences were identified on the basis of dyads’ behavioural responses to a perturbation. Specifically, ‘pure’ externalizing children seemed to have mothers who were permissive and either remained the same or became even more so in response to the perturbation. MIXED children and mothers showed a similarly permissive pattern before being perturbed but afterwards, these mothers became less permissive. Thus, EXT dyads seemed to remain “stuck” in their permissive pattern while MIXED dyads became mutually hostile instead.

Given the nature of this exploratory, piloting phase, it seems important to replicate and extend the findings before proceeding with any detailed attempt at interpretation. Interpretations of the present results would be particularly speculative given several limitations of the current piloting phase; these weaknesses were directly addressed in the second phase of the study. The first limitation was the coding system. Coding affect and content separately may have sometimes resulted in codes that were misleading. For the purposes of this study, a more appropriate strategy might have been to use a system that considers both affect and content and provides one code for each conversational turn. The coding system also seemed to be missing a number of problem-solving behaviours that were common in this sample. For example, children were often observed ignoring their parent (e.g., looking out the window), acting silly (e.g., making faces at the one-way mirror) and interrupting rudely. Parents also exhibited behaviours that were not included in the coding system. For instance, parents often lectured their child in a rhetorical style and they provided leading questions that were not intended to elicit opinions (e.g., “so, when you see Billy, are you going to be nice to him or hit him and get suspended again?”).
The second limitation in this phase concerns the state space grid methodology. The grids provided rich portraits of the temporal unfolding of parent-child behaviour; they also seemed well-suited for representing changes after the perturbation. But they were biased in that they largely depicted the parent’s response to the child’s behaviour. Although the grids could be read in such a way as to extrapolate the child’s response to the parent, this was not their purpose. The decision to place the parent’s behaviour at lag 1 was theoretically driven by interest in the permissive pattern. But, ideally, the state space grids should be able to represent behaviour on the dyadic level without arbitrarily considering one member the actor and the other the reactor. Modifying the current state space grids so that dyad members can be represented simultaneously as both acting and reacting could provide more information about the child’s influence on his mother -- information that was not captured in the current phase.

The third limitation that should be discussed is the sequential analysis procedure. Sequential analysis has been widely used with observational data, particularly in the study of dyadic interactions. But there are some problems with using this technique (Bakeman & Gottman, 1997; Bakeman & Robinson, 1994; Gottman & Roy, 1990). In terms of the present study specifically, the conditional probabilities that were derived for assessing whether permissiveness increased or decreased after the perturbation rely in part on the base rates of the target behaviours (e.g., negativity on the part of the child). The lower the base rate for negativity, the less reliable the conditional probability will be. The problem becomes clearer with an example: If a child was hostile 10 times before the perturbation and the mother responded 7 times with a positive statement, then the conditional probability for permissiveness would be .70. However, if the child was negative only once after the perturbation and the parent responded with a positive statement, the conditional probability would be 1.00. Yet given the very low base rate in the latter case and the uneven distribution
of these behaviours in the pre- versus post-perturbation sessions, it does not seem valid to conclude that permissiveness increased after the perturbation. A method that controls for base rates is needed. Moreover, comparing two conditional probabilities is not as straightforward as it may seem. What magnitude of difference between the two probabilities constitutes a real decrease? If the two probabilities are .49 and .45, is that a big enough difference? For the current phase, any difference was considered enough, but it seems clear that there are problems with this method. When the problem of base rates is combined with the problem of comparing conditional probabilities, the results of this study are tenuous at best. A statistical technique that addresses these limitations is needed – one that is well-suited to complementing the graphical state space grid methodology.

Because of the analytic limitations mentioned, there are two implicit hypotheses, which are central to a DS perspective, that could not be tested in this phase. The first of these is embedded in the second research question: can differences in parent-child problem-solving interactions be detected through the standard assessment procedure (i.e., discussing a topic of conflict) or can these differences be identified only by perturbing the system? Subtypes' interactions before the perturbation were not compared statistically; the state space grids were inspected instead. Part of the reason for this is related to the sequential analysis problem discussed earlier – because each dyad exhibited a different base rate for each type of behaviour, the various combinations of conditional probabilities could not be tested statistically. To reliably test whether dyads were indeed indistinguishable until after the perturbation, an analytic method was needed that considers all potential transitions in relation to their base rates, and allows for their comparisons across groups.

The second implicit DS hypothesis that was left untested concerns the real-time phase shift or discontinuous change after the perturbation. Again, sequential analysis is not well-suited for testing whether the change that was exhibited by MIXED dyads was indeed a
discontinuous one, or if it was simply a gradual change over the entire problem-solving session. An analytic method that can directly test this hypothesis was required.

Despite these weaknesses, the design of the study – based on DS principles – seemed to tap important interactional differences between subtypes of aggressive children and parents. It was important to conduct this preliminary exploration because hypotheses about the nature of dyadic change were difficult to generate from past research. The results of this first phase helped develop more specific hypotheses that were tested more rigorously in the second, hypothesis-testing phase.
CHAPTER 3

Phase 2 – Hypotheses Testing

3.1 Objectives

Four objectives were addressed in the second phase of this study. The first was to replicate the results from the first phase by using the same previously employed analytic strategies. However, as discussed in the Discussion section of Chapter 2, there were several limitations to these analytic techniques. The remaining objectives were aimed at systematically addressing these weaknesses.

The results from Phase 1 led to several specific hypotheses regarding differences in MIXED and EXT interaction patterns. These hypotheses are outlined below. The second aim of the current phase was to test these differences – expected to appear in response to the perturbation – using a more rigorous analytic strategy than lag-sequential analysis affords. More specifically, a statistical method was needed that: (1) was appropriate for analyzing sequential data, (2) could test changes on the dyadic, as well as the individual, level, (3) could control for the influence of base rates so that transitional probabilities could be compared across groups, and (4) was flexible enough to test temporally-based hypotheses. To meet this second objective, a number of log-linear modeling strategies were employed.

The third objective was to test the two DS-based hypotheses that were not explicitly addressed in the previous phase; namely, that dyadic subtypes do not look different until they are perturbed and that the change observed for MIXED dyads is a discontinuous one. These predictions were tested through log-linear modeling.

The fourth aim of this phase was to modify the previously employed state space grids in such a way that dyad members could be represented as both initiating (lag 0) and reacting (lag 1) simultaneously. This new dyadic state space grid was intended to graphically
represent behaviour both on the dyadic and individual level. Moreover, by retaining the integrity of each dyad (rather than averaging interaction patterns by group), the grids were intended to demonstrate the multivariate log-linear findings visually, and more intuitively.

3.2 Research Questions and Hypotheses

Four research questions were investigated in the current phase of the study. The first three were also asked in the exploratory phase. They are reiterated here with specific hypotheses. The fourth question was not directly examined in the first phase, but it was implicit in the design.

1. Do subtypes of aggressive children differ in their parent-child problem-solving interactions? It was hypothesized that they would differ.

2. Can these structural differences be detected by simply using the standard family problem-solving paradigm, or are they better accessed by perturbing the interaction and observing dyads’ behavioural responses? It was expected that EXT and MIXED dyads would show similar interaction patterns before the perturbation, but that they would be distinguishable on the basis of their dyadic response to the perturbation.

3. If dyads change their behavioural habits after the perturbation, what is the specific nature of this change for each subtype? Based on the state space grid and sequential analyses in the first phase, it was expected that both EXT and MIXED dyads would exhibit a permissive dyadic pattern before the perturbation. For EXT dyads, no change was expected after the perturbation. In contrast, MIXED dyads were expected to change to a mutually hostile pattern after the perturbation.

4. Is the change in dyadic patterns a discontinuous one, or is it gradual over the entire problem-solving session? This question was intended to extend the second research question.
Based on DS principles, the change for MIXED dyads was predicted to be abrupt and discontinuous.

3.3 Methods

3.3.1 Participants

Parents and children were recruited from two treatment programs for aggressive children in the same urban psychiatric institute that served as the setting for the first phase. Child participants were 25 boys between 8 and 12 years of age ($M = 9$ years, 11 months), referred by either a mental health professional, teacher, or parent. Mothers of referred children also participated in the study. The same inclusion and exclusion criteria were used in the second phase as in the first. Children were classified into 2 distinct groups based on a combination of information from the CBCL and TRF (the same strategy as in Phase 1).

In terms of demographic information, data was available on 22 of the 25 children. Seventeen of the children (77.3%) were Caucasian, one (4.5%) was Caribbean-Canadian, and four (18.1%) were mixed Caucasian/Caribbean-Canadian. In terms of parents' marital status, seven (31.8%) were single (never married), seven (31.8%) were married, three (13.6%) were separated, and five (22.7%) were divorced. Finally, the only available estimate of socio-economic status in the current study was the highest level of education attained by the mother. One parent (4.5%) had completed up to grade 8, eleven (50%) had completed high school, 6 (27.3%) had completed college or vocational training, and four (18.1%) had completed graduate or professional school.

3.3.2 Classification Criteria

The same method of classification was used as in the pilot phase, except that the clinical cut-off on the CBCL and TRF ($T \geq 70$) was used instead of the borderline cut-off ($T$
It was decided to use a higher threshold to ensure that more precise examples of EXT and MIXED children were obtained. There were 2 CBCLs that were incomplete and 2 TRFs that were not returned; in these cases, the classification was based on the checklist that was available.

'Pure' Externalizing. To qualify for the 'pure' externalizing group (EXT), children were required to score at or above the clinical cut-off ($T \geq 70$) on the Externalizing scale of either the CBCL or the TRF, and to score below this cut-off on the Internalizing scale on both the CBCL and TRF, as in the pilot phase.

'Mixed' Externalizing and Internalizing. Children qualified for the mixed group (MIXED) if they scored at or above the clinical cut-off ($T \geq 70$) on the Externalizing scale of either the CBCL or the TRF and scored above this cut-off on the Internalizing scale on either the CBCL or TRF, as in the pilot phase.

Using these clinical cutoff criteria, 9 children were classified as EXT and 16 were classified as MIXED. Three children (8%) were excluded from the sample for various reasons: one child's mother spoke Chinese throughout the videotaped session, one dyad had audio failures during the videotaping, and one was omitted because the mother spoke the entire session except for one short utterance from the child. The participants in the final analyses included 8 EXT and 14 MIXED. Means and standard deviations for the Externalizing and Internalizing $T$-scores on the CBCL and TRF are presented for each group in Table 3.1.
Table 3.1 Means and standard deviations on CBCL and TRF scores by group

<table>
<thead>
<tr>
<th>Measure</th>
<th>EXT (N=8)</th>
<th>MIXED (N=14)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>CBCL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Externalizing</td>
<td>68.00 (7)</td>
<td>10.05</td>
</tr>
<tr>
<td>Internalizing</td>
<td>48.29 (7)</td>
<td>12.05</td>
</tr>
<tr>
<td>TRF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Externalizing</td>
<td>74.00 (8)</td>
<td>6.28</td>
</tr>
<tr>
<td>Internalizing</td>
<td>59.25 (8)</td>
<td>5.28</td>
</tr>
</tbody>
</table>

Note: Number of measures available for each mean is shown in brackets.

3.3.3 Procedure

The procedure described for the pilot study was identical to the one used in the current phase.

3.3.4 Coding System

The coding system used for the current phase of the study was changed to address some of the original limitations (see Discussion section in Chapter 2). The most significant change was that affect was no longer a separate coding category. The problems with separating affect and problem-solving content were discussed in the Procedures and Discussion sections of the previous chapter. The resulting coding system was a modified version of Robin & Weiss' (1980) variation on the Marital Interaction Coding System (Weiss, Hops, & Patterson, 1973). The coding scheme was designed to classify all verbal behaviours into 1 of 4 categories (positive, neutral, negative and hostile).

Unlike the coding system for the first phase which included 2 levels of positivity (very positive and positive), there was only one positive category in the current system because each positive code on its own occurred very infrequently (across all groups, only 1% of children’s codes and only 5% of parents’ codes were positive). Behaviour coded as
positive included: approve, agree, elicit opinion, humour, offer solution, consequential statement, and polite request for compliance. Neutral behaviours included: exchange information, answer, question, listen. Negative behaviours were separated into two categories, negative and hostile. This was done to distinguish behaviours that might be considered negative (i.e., disagree, deny) but a natural part of any conflict resolution exercise, from those behaviours that were intended to attack, diminish or degrade the other (i.e., complain, threaten). Four codes fell into the negative category: disagree/deny, rhetorical teaching/leading question, command, and ignore/evade. Finally, six codes were categorized as hostile: interrupt, sarcasm, irritation, non-comply, complain/criticize/accuse, and threaten. Each category with its corresponding codes and examples are listed in Table 3.2. Coders were instructed to consider not only the content, but also the affective valence of each conversational turn.

3.3.5 Observers and Reliability

Two undergraduate students were involved in coding the videotaped interactions. Both students were blind to the purposes and hypotheses of the study. In addition to the videotaped observations collected in the current phase of the study, the 11 dyads from the pilot phase were recoded using the new coding procedure. The original tapes were recoded because the data from both phases were combined later in the analyses (see Data Analyses and Results sections). Coders were trained over 15 hours until they reached 90% agreement. The training was conducted on early pilot data collected the previous year (not the phase 1 data); these data were not included in the present study. One student coded all the videotapes. The second student coded 10 (approximately 30%) randomly selected problem-solving sessions for the purpose of calculating interrater reliability. Cohen's kappa was computed separately for each of the four mother and child codes in order to calculate the degree of agreement, correcting for the chance of random agreement. For the child codes, the
following kappas were obtained: .29 for positive, .72 for neutral, .63 for negative, .63 for hostile. For the parent codes, the kappas were: .42 for positive, .72 for neutral, .63 for negative, and .53 for hostile. The reliability was considered acceptable (Fleiss, 1981) for all codes except for the positive codes; it is likely that the reliability for these codes was low because they occurred much less frequently than the others.

Table 3.2 Coding system

<table>
<thead>
<tr>
<th>Code</th>
<th>Problem-solving Strategy</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive (1)</td>
<td>approving or supportive comment; agree/assent</td>
<td>&quot;You did great last week!&quot;</td>
</tr>
<tr>
<td></td>
<td>eliciting an opinion</td>
<td>&quot;What do you think?&quot;</td>
</tr>
<tr>
<td></td>
<td>humour</td>
<td>Telling a joke; laughing at a funny face</td>
</tr>
<tr>
<td></td>
<td>offering a solution</td>
<td>&quot;You could try walking away when he bugs you.&quot;</td>
</tr>
<tr>
<td></td>
<td>consequential statement</td>
<td>&quot;If you swear like that, kids won't want to be friends with you.&quot;</td>
</tr>
<tr>
<td></td>
<td>polite request for compliance delivered with positive affect</td>
<td>&quot;Try to stop acting for the camera.&quot;</td>
</tr>
<tr>
<td>Neutral (2)</td>
<td>exchange of information/clarification; answer to a question</td>
<td>&quot;That was last Saturday.&quot;</td>
</tr>
<tr>
<td></td>
<td>request for clarification or question</td>
<td>&quot;How many times did you go?&quot;</td>
</tr>
<tr>
<td></td>
<td>actively listening</td>
<td>&quot;uh huh.&quot; &quot;Yeah...&quot;</td>
</tr>
<tr>
<td>Negative (3)</td>
<td>disagree/deny</td>
<td>&quot;No, I didn't say that.&quot;</td>
</tr>
<tr>
<td></td>
<td>Rhetorical teaching/leading question</td>
<td>&quot;Fighting is no way to go about that.&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&quot;Does fighting get you in more trouble or does it win the respect of your teachers?&quot;</td>
</tr>
<tr>
<td></td>
<td>command</td>
<td>&quot;Stop changing the subject.&quot;</td>
</tr>
<tr>
<td></td>
<td>ignore/evade or silly behaviour</td>
<td>not answering a question; saying something off topic: &quot;I don't know&quot;</td>
</tr>
<tr>
<td></td>
<td>interrupt</td>
<td>code is used when one dyad member interrupts the other with a hostile tone, and no other code applies</td>
</tr>
<tr>
<td>Hostile (4)</td>
<td>non-compliance</td>
<td>&quot;You can't make me do it.&quot;</td>
</tr>
<tr>
<td></td>
<td>sarcasm</td>
<td>&quot;Yeah, the teacher really deserves respect when she's always wrong.&quot;</td>
</tr>
<tr>
<td></td>
<td>irritation/rolling eyes</td>
<td>irritable tone of voice with content that can't be grouped under another code</td>
</tr>
<tr>
<td></td>
<td>complain/accuse/reproach/criticize</td>
<td>&quot;You never listen.&quot;</td>
</tr>
<tr>
<td></td>
<td>threaten</td>
<td>&quot;You do or else you'll never see that game again.&quot;</td>
</tr>
</tbody>
</table>
3.3.6 Operationalization of terms

As in the piloting phase, two main parent-child interaction patterns were assessed: permissiveness and mutual hostility. As in the first phase, patterns were operationalized as follows:

**Permissiveness.** All instances of child “negative” and “hostile” codes were identified. A sequence was defined as permissive if the parent responded immediately (i.e., in the next conversational turn; lag 1) to the child’s “negative” or “hostile” behaviour (i.e., codes 3 or 4) with a “neutral” or “positive” behaviour (i.e., codes 1 or 2).

**Mutual hostility.** All parent and child “hostile” codes (code 4) were identified. A sequence was defined as mutual hostility if the next conversational turn (i.e., lag 1) was also coded “hostile”. Thus, either parent or child could initiate this sequence.

3.4 Data Analysis

The current study combined several analytic strategies. Each step in the analyses was designed to build upon the results from the previous steps. For the purposes of clarity and to minimize redundancy, a brief overview of each strategy is provided in the next section, followed by more detailed descriptions of the analytic procedures in the Results section.

3.4.1 Sequential Analyses

The first analytic strategy used the same case-based approach presented in the pilot phase. These analyses were conducted to simply replicate the findings from the sequential and chi-square analyses obtained in the first study. Following this, data from the current study and the piloting phase were combined to increase the power of these tests and the analyses were re-run on the whole sample.
3.4.2 Loglinear Modeling

As explained in the Discussion section of Phase 1, although the sequential analysis and chi-square strategy retain the integrity of the individual case, there are several limitations to the procedure. Thus, in the second stage, interaction patterns (i.e., parent-child transitions) were analyzed using a multivariate approach which combined log-linear and hierarchical log-linear modeling procedures (e.g., Bakeman & Gottman, 1997; Bakeman, et al., 1995; Bakeman & Quera, 1995; Feinberg, 1983; Gottman & Roy, 1990; Wickens, 1993). These procedures overcome most of the limitations inherent in sequential analysis. Unlike basic lag-sequential analysis, log-linear approaches allow for sequential questions to be examined through the lens of an established statistical tradition (Bakeman & Quera, 1995). Log-linear analysis is similar to the familiar chi-square analysis: expected cell frequencies are computed from the row and column totals and then compared to the observed cell frequencies. But unlike chi-square analysis, a log-linear approach is not restricted to 2-dimensional tables. Log-linear modeling examines higher-order interactions (3-way, 4-way interactions, etc.) between multilevel categorical variables and identifies the transitions that account for these interactions.

There are several advantages to this approach. First, unlike traditional sequential analysis, log-linear modeling is particularly well-suited for testing group differences in interaction patterns (Bakeman & Quera, 1995; Allison & Liker, 1982). It controls for base rates of given behaviours for each group separately; thus, group effects are not biased by differences in base rates. Second, log-linear modeling takes a “whole-table view” rather than focusing on individual transitions (or, as is the case most often, a number of individual transitions). The latter approach is highly susceptible to Type I error. An example may help to clarify this point. In the current study, the permissiveness transition (i.e., child hostile → parent neutral/positive) is of central concern and, in the pilot study, sequential analysis was
used to identify whether the probability associated with this transition increased or decreased after the perturbation. But no other transitions were examined and this leaves open the possibility that other transitions (e.g., child hostile → parent negative) were equally, or even more, important for characterizing the interaction. A more problematic issue with the sequential analysis approach is that even when all transitions are examined, there is no way to establish if the various conditional probabilities could have occurred by chance or are statistically different from one another. A whole-table approach is needed to address these issues. The log-linear approach yields a tablewise, omnibus statistic (the likelihood-ratio chi-square or $G^2$) and, just as in the case of the $F$ ratio in analyses of variance, only when this statistic is significant is the significance of individual cells considered. A final advantage to log-linear analysis is that it suggests strategies that can decompose the interrelated cell counts and test specific hypotheses (Bakeman & Gottman, 1997).

Overlapped sampling, the most common format for analyzing sequential data (Bakeman & Quera, 1995; Bakeman & Dorval, 1989), was used for the first set of log-linear analyses. In this form of sampling, the events from which lags are computed is adjusted incrementally over the series. Thus, for each two-event sequence, each behaviour was considered an antecedent for the first sequence and a consequent behaviour for the next sequence; in this way, a “floating window” of two-event sequences was developed. Through this sampling procedure, antecedent (lag0) and consequent behaviours (lag1) are two of the categorical variables (also called factors) in the multiway contingency table. Cells in this table represent frequency counts of specific parent-child and child-parent transitions. For example, the sequence child hostile → parent neutral is one transition; the number of times this transition is observed for each dyad is tallied and represents one cell in the contingency table. The same procedure is applied to all possible transitions.
A third categorical variable in this multiway table was labeled "Partner"; this factor referred to the particular dyad member at lag0 or lag1. Partner was included as a variable in order to test the importance of knowing which dyad member was considered the antecedent and which was the consequent. In other words, by including Partner as a variable, the effect of knowing if parent or child is initiating or reacting to a particular behaviour can be assessed. The models that were tested across all analyses included a combination of three or more of the following variables: Lag0 (behaviour of child or parent at time t; Positive, Neutral, Negative, Hostile), Lag1 (behaviour of child or parent at time t+1; Positive, Neutral, Negative, Hostile), Partner (dyad member considered as antecedent or consequent; Parent, Child), Group (EXT, MIXED), and Period (pre-perturbation, post-perturbation). Each two-event sequence was categorized according to each of the factors.

To answer the first two research questions, a series of hierarchical log-linear procedures was conducted to test the main hypothesis that dyadic subtypes' interactions would look similar before, but become distinct after, the perturbation. Modeling proceeded from the most inclusive, general test of the hypothesis to a number of systematically more specific tests.

In hierarchical log-linear modeling, the researcher starts with a model that contains all possible interactions (the saturated model). Then, through a procedure of backward elimination, one by one the higher order interactions that do not explain the observed frequencies (in the case of sequential data, the frequencies are transitional probabilities) are eliminated. The "final" or "best" model that this procedure yields is one that suitably fits the observed frequencies and also contains the fewest necessary parameters (Bakeman & Robinson, 1994). By definition, the next backward step in the hierarchical procedure would result in a model in which the observed frequencies differ significantly from the expected (modeled) frequencies, yielding a significant increase in the likelihood ratio chi-square.
The next set of log-linear procedures were conducted to examine the third research question regarding the specific nature of the change in dyadic interactions after the perturbation. In order to tap the particular parent→child and child→parent transitions that changed and remained stable after the perturbation, non-overlapped sampling was used. Separate analyses were run to examine the impact of the child's antecedent behaviour on the parent's consequent behaviour and the parent's antecedent behaviour on child's consequent behaviour. This meant that for each analysis, models were developed on half of the dataset. Thus, to increase the power of these analyses, data from the pilot phase was combined with the current, phase 2 data. Adjusted residuals taken from these modeling procedures were examined to identify the specific transitions that differed significantly before and after the perturbation. Adjusted residuals are distributed approximately like z-scores but, unlike z-scores, they have the added advantage of being computed independent of the number of tallies (Bakeman & Gottman, 1997; Haberman, 1978). Once these significant transitions were identified, a “winnowing” procedure (Bakeman & Quera, 1995; Bakeman & Gottman, 1997; Bakeman et al., 1995) was applied to more stringently test the reliability of the results and to guard against Type I error. This “winnowing” procedure was important to conduct because adjusted residuals form an “interrelated web” in that, if some are large, others are necessarily small (Bakeman & Quera, 1995), posing the problem of which residuals to emphasize and which to consider induced by the others.

The final research question was intended to examine the profile of change that was expected to occur for MIXED dyads. This change was hypothesized to occur discontinuously as a result of the perturbation, rather than gradually over the course of the problem-solving session. To examine this hypothesis, the same strategy used to test the first two research questions was applied, but this time, separate models were constructed to test differences between the first and second two minutes that comprised the pre-perturbation period and the
second and third two minutes (post-perturbation period). This procedure is conceptually equivalent to Bakeman and colleagues' (1995) recommendation for testing the importance of rare events in sequential data; when testing for the effect of an event that happens very infrequently, but is theoretically important, they recommend fitting two separate models, one before and one after the rare event, and comparing the two for differences. If, contrary to what was hypothesized, change occurred gradually over the problem-solving session, then differences would be identified between the first and second segments, as well as the second and third. Differences were expected to emerge only on the latter comparisons.

3.4.3 State space grid analysis

To test group differences with the log-linear procedures, the sequential data from each dyad had to be pooled within each group. In other words, the frequency values in each cell (i.e., each possible two-event sequence) represented the total number of observed two-event sequences across all dyads within each group. This leaves open the possibility that only one or two dyads in each group -- with very high frequency scores in particular cells -- could account for differences found between groups. To guard against this "outlier bias," an additional, case-sensitive approach was required -- state space grids were constructed for all dyads. Thus, rather than using the grids as an exploratory tool (as was done in the pilot phase), in the current study the grids were used to flesh out the log-linear results. Similar to the strategy of presenting scatterplots for the purposes of clearly demonstrating the relations among variables, the grids provided a snapshot of the relations between parent and child behaviours and allowed for the identification of any dyads that did not conform to the findings from the log-linear analyses. In short, they provided a case-by-case temporal narrative that described the models derived through log-linear analyses.
3.4.4 Computer programs

Sequential analyses were conducted using Bakeman and Quera's program, GSEQ for Windows (Version 3.6, January 2000). The log-linear procedures were carried out using SPSS' LOGLINEAR (Bakeman, Adamson, & Strisik, 1995) and HILOG (Bakeman & Robinson, 1994). Finally, MACSPIN (Donoho, Donoho, & Gasko, 1985) was used to generate the state space grids.

3.5 Results

3.5.1 Preliminary Analyses

To ensure that groups did not differ on any demographic variables, ANOVAs and chi-square analyses were conducted. A series of one-way ANOVAs were performed on mother's age ($M = 35$ years) and child's age ($M = 9$ years, 11 months). Chi-square analyses were performed on three categorical variables: (1) ethnicity, (2) mother's highest level of education, and (3) parent's marital status. No significant differences were found on any of these comparisons.

Consistent with phase 1 of the study, a manipulation check was conducted for each dyad, comparing the first and second problem-solving sessions, to ensure that analyses were run on the most emotionally arousing session. As explained in more detail in the pilot phase, the frequency of "negative" and "hostile" codes (codes 3 and 4) was calculated separately for each dyad and each session. For 7 dyads (4 MIXED and 3 EXT), the frequency of negative codes was higher in the first session than in the second. For these dyads, the first session was analyzed; for the remaining 15, the second session was used for analyses.
3.5.2 Sequential Analyses

Sequential analyses were conducted to replicate the findings in the pilot study. Analyses proceeded as in the first study. First, all incidences of child negativity (code 4 or 5) were identified and the conditional probability that the parent would respond immediately (lag 1) with a positive or neutral behaviour (code 1, 2, or 3) was computed; this conditional probability represented the permissiveness probability (for an example, see Data Analysis section in Chapter 2). Conditional probabilities were computed separately before and after the perturbation, for each dyad. In the next step, dyads were assigned one of two categorical codes depending on whether their permissiveness probability (1) increased or stayed the same after the perturbation or (2) decreased after the perturbation. Finally, the Pearson chi-square statistic was computed to compare MIXED and EXT dyads with respect to decreasing versus increasing/same permissiveness probabilities. Results revealed a significant association, $X^2 = 5.51$ (1), $p < .02$, with MIXED dyads showing a pattern of decreasing permissiveness after the perturbation and EXT dyads showing increasing/same permissiveness. These results were consistent with the pilot findings. To increase the power of the chi-square test, data from both phases of the study were pooled. The combined sample included 19 MIXED and 14 EXT. Results revealed a highly significant chi-square, $X^2 = 7.16$ (1), $p < .007$. The specific cross-tabulation values are presented for each group in Figure 3.1.
3.5.3 Log-linear Modeling

Questions 1 and 2: Group differences in dyadic interactions

The first set of log-linear modeling procedures addressed the first two research questions: Do dyadic subtypes differ in parent-child interactions and are these differences due to the perturbation? The main hypotheses were that MIXED and EXT dyads' interaction patterns would differ, but these differences were only expected to be evident after the perturbation. Modeling procedures progressed from the most general, inclusive test of the hypotheses to more specific tests to localize effects.

As explained in the Data Analyses section, the models that were tested across all analyses included a combination of three or more of the following five variables: Lag0 (behaviour of child or parent at time t; Positive, Neutral, Negative, Hostile), Lag1 (behaviour of child or parent at time t+1; Positive, Neutral, Negative, Hostile), Partner (dyad member considered as antecedent or consequent; Parent, Child), Group (EXT, MIXED), and Period (pre-perturbation, post-perturbation). Each two-event sequence was categorized according to each of the factors.

Figure 3.1 Percentage of dyads by group who increased/stayed the same versus decreased in permissiveness after the perturbation
Beginning with the most inclusive, omnibus test of the main hypotheses, all five factors were included in the first hierarchical log-linear analysis. Thus, a $4 \times 4 \times 2 \times 2 \times 2$ table was modeled to generate expected frequencies and these values were then compared to the observed frequencies. Recall that with sequential data, frequencies represent the number of specific two-event sequences (i.e., parent-child and child-parent transitions) within each group. The number of cases in this analysis was 2236 (i.e., each of the possible combinations of behaviours at lag 0, with behaviours at lag 1, with each type of group, period, and dyad member considered as the antecedent) and the number of cells was 192 (i.e., factor levels multiplied together); thus, the sample size fit the minimum requirement of 5 times the number of cases as cells (Bakeman & Quera, 1995; Green, 1988).

As described in the Data Analysis section, in this modeling procedure, one starts with the saturated model (the 5-way interaction) and, through backward elimination, non-significant higher order interactions are eliminated until the most parsimonious model is reached. If, as hypothesized, interaction patterns were similar between groups before the perturbation and differed only after, then the best or "Final" fit for the observed frequencies should include the 4-way interaction between lag0 x lag1 x Group x Period. This would indicate that parent-child interactions varied according to Group and Period (pre- and post-perturbation). If lower-order interactions (or main effects) explain (or fit) the observed frequencies more parsimoniously, then the 4-way model would be broken down in the next steps into simpler components and it would be concluded that Period is not meaningful and/or Group does not distinguish dyadic patterns.

As expected, results revealed that the "Final" model terms that best explained the observed data included the 4-way interaction term (lag0 x lag1 x Group x Period); it also
included a 3-way term (Partner × lag0 × lag1), $G^2 = 42.04, df = 48, p = .71^2$. Table 3.3 shows the change in $G^2$ (and the associated change in df and p-level) if the 4-way and 3-way interactions were deleted. The results can be interpreted as preliminarily supporting the main hypotheses: Dyadic interactions (Lag0 × Lag1) of MIXED and EXT dyads indeed differed according to group type and Period type (pre- and post-perturbation). In addition, dyadic interactions (Lag0 × Lag1) varied according to which member (parent or child) was considered the antecedent and the consequent behaviour (Partner) -- knowing who is at lag0 helps to predict the nature of the two-event sequence.

Table 3.3 Final model

<table>
<thead>
<tr>
<th>Final log-linear modeling interaction</th>
<th>Δdf</th>
<th>ΔG²</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lag0 × Lag1 × Group × Period</td>
<td>9</td>
<td>20.42</td>
<td>&lt;.02</td>
</tr>
<tr>
<td>Partner × Lag0 × Lag1</td>
<td>9</td>
<td>32.18</td>
<td>&lt;.0003</td>
</tr>
</tbody>
</table>

NOTE. "Values represent the change in df, $G^2$, and the p-level associated with this change if the interaction was deleted from the model.

The next set of modeling procedures was designed to more specifically address the hypothesis that groups would differ in interaction patterns only after the perturbation, and not before. Separate models for the pre- and the post-perturbation periods were developed through the hierarchical procedure. For each period, four factors constituted the saturated model, Lag0 × Lag1 × Group × Partner. If dyadic interactions differed between groups based on the perturbation, there should be a 3-way effect between Lag0 × Lag1 × Group only for the post- and not for the pre-perturbation period. As shown in Table 3.4, the results supported this hypothesis.

---

2 By definition, "final" model likelihood ratio chi-square values are always statistically non-significant, meaning that the model explains the observed data adequately. By convention, for all remaining modeling procedures, the "final" model chi-square values will not be reported. Rather, what is important to report is the change in these values if they were to be deleted from the model.
Table 3.4 Pre- and post-perturbation final models

<table>
<thead>
<tr>
<th>Final log-linear modeling interaction</th>
<th>$\Delta df^a$</th>
<th>$\Delta G^2a$</th>
<th>$p^a$</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE ($n = 1378)^b$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partner $\times$ Lag0 $\times$ Lag1</td>
<td>9</td>
<td>34.85</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Group</td>
<td>1</td>
<td>61.49</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>POST ($n = 859)^b$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lag0 $\times$ Lag1 $\times$ Group</td>
<td>9</td>
<td>27.18</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Partner $\times$ Lag0</td>
<td>3</td>
<td>89.53</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Partner $\times$ Lag1</td>
<td>3</td>
<td>87.03</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

NOTE. 'Values represent the change in df, $G^2$, and the $p$-level associated with this change if the interaction was deleted from the model. 'Sample size refers to the number of cases, not dyads.

The results of the final models can be interpreted as follows: For the pre-perturbation Period, there is a relation between parent and child’s behaviour (Lag0 $\times$ Lag1) and this association varies according to whether the parent or child’s behaviour is considered to be the antecedent (Partner); but these associations do not differ according to group. The main effect for Group simply shows that there are more events for one group than the other; if there were different types of events per group, then there would be a lag0 $\times$ Group effect. In contrast, and as expected, the 3-way interaction found for the post-perturbation data means that the relation between parent and child’s behaviour in this latter period varies according to Group. The two 2-way effects for the post-perturbation period indicate that behaviours considered antecedent and consequent are associated with particular parent and child codes. These effects will be broken down into more content-specific descriptions of the parent and child behaviours in the following section. In summary, the hierarchical log-linear findings thus far supported the first two hypotheses: (1) aggressive subtypes differed in their parent-child interactions and (2) these differences were evident only after the perturbation and not before.

In the next section, the specific content of the interactional differences were examined.
Question 3: Changes in the content of MIXED and EXT dyads' interactions

The next set of analyses were intended to address the third research question regarding the specific nature of the changes after the perturbation for each subtype. It was hypothesized that both EXT and MIXED dyads would exhibit a permissive dyadic pattern before the perturbation. After the perturbation, there were no changes in these dyadic patterns expected for the EXT group. MIXED dyads, on the other hand, were expected to shift from a permissive to a mutually hostile pattern after the perturbation.

From the previous analyses, we know that groups did not differ in their parent-child interactions before the perturbation, but that they did become distinct after the perturbation. It is still unclear, however, whether both groups, or only the MIXED group, changed their patterns of interaction after being perturbed. Thus, the first step in testing the third hypothesis was to run separate hierarchical modeling procedures for each group.

The saturated model that began the hierarchical procedure for each group was the 4-way interaction, Lag0 X Lag1 X Period X Partner. As shown in Table 3.5, Final models for each group preliminarily support the third hypothesis. For the EXT group, the parent's and child's behaviour (Lag0 X Lag1) were associated with each other and varied according to who was considered the antecedent, but these associations were independent of Period. In addition EXT dyad members' independent behaviours changed after the perturbation (i.e., lag0 X Period; lag1 X Period), but there were no such changes evident in the interaction patterns (i.e., lag0 X lag1 X Period). In contrast, the 3-way interaction indicating that parent-child interactions changed according to Period (i.e., Lag0 X Lag1 X Period) did fit the data for MIXED dyads. The other two 2-way interactions for the MIXED group indicate that knowing who spoke at Lag0 and Lag1 provides information regarding the specific type of behaviours.
Having established that the parent-child interactions of MIXED, and not EXT, dyads changed after the perturbation, the next set of procedures were intended to specify the parent-child transitions that significantly contributed to the final models obtained for each group. Before proceeding with these next analyses, however, the data from the pilot study was combined with the second study. The main reason for combining datasets was that, for the next set of procedures, non-overlapped sampling was required (i.e., either parent or child had to be considered at Lag0 and Lag1, depending on the model being tested and the question being asked). As a result, the sample size for this set of analyses was half that of the previous set. Given the number of cells in the design, the cell counts were quite small compared to what has been recommended (Bakeman & Gottman, 1997); thus, to obtain reliable results, data from the pilot and current study were combined for the remaining analyses.

The combined sample included 14 EXT and 19 MIXED. Descriptive statistics on the combined dataset are presented in Tables 3.6 and 3.7. Frequencies and percentages of parent and child codes are presented separately by Period (Pre- and Post-perturbation) and by group (MIXED, EXT) in Table 3.6. Table 3.7 shows the joint frequencies and conditional
probabilities for all combinations of antecedent-consequent behaviour for the combined sample; values are presented separately for pre- and post-perturbation, by group. In several cases, there are minor discrepancies between the two tables; the total frequencies (Table 3.6) are often a few events higher than are indicated by the joint frequencies (Table 3.7). This is because the code just before the perturbation and at the end of each session could not be followed by another code. The important values to highlight, for now, in Table 3.7 are the conditional probabilities associated with parental response to child hostility (one indication of permissiveness). For both EXT and MIXED dyads, in the pre-perturbation period, parent neutral is the most common response to child hostility. Thus, as predicted, a permissive pattern seems to be evident for both groups before the perturbation. Also, it is interesting to note how infrequently children's behaviour in both groups was coded as positive.

Table 3.6 Frequencies of parent and child codes by Period

<table>
<thead>
<tr>
<th>Group</th>
<th>Code</th>
<th>N (and %)</th>
<th></th>
<th></th>
<th></th>
<th>Child</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Parent</td>
<td>Post</td>
<td>Parent</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
<td></td>
</tr>
<tr>
<td>EXT</td>
<td>Positive</td>
<td>34 (.07)</td>
<td>46 (.16)</td>
<td>5 (.01)</td>
<td>7 (.03)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Neutral</td>
<td>246 (.50)</td>
<td>144 (.51)</td>
<td>229 (.48)</td>
<td>138 (.50)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>86 (.18)</td>
<td>51 (.18)</td>
<td>27 (.06)</td>
<td>14 (.05)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hostile</td>
<td>122 (.25)</td>
<td>40 (.14)</td>
<td>218 (.46)</td>
<td>118 (.43)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sum</td>
<td>488</td>
<td>281</td>
<td>479</td>
<td>277</td>
<td></td>
</tr>
<tr>
<td>MIXED</td>
<td>Positive</td>
<td>59 (.10)</td>
<td>38 (.11)</td>
<td>14 (.02)</td>
<td>8 (.02)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Neutral</td>
<td>330 (.53)</td>
<td>158 (.46)</td>
<td>267 (.44)</td>
<td>144 (.42)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>100 (.16)</td>
<td>93 (.27)</td>
<td>39 (.06)</td>
<td>22 (.06)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hostile</td>
<td>128 (.21)</td>
<td>53 (.16)</td>
<td>285 (.47)</td>
<td>167 (.49)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sum</td>
<td>617</td>
<td>342</td>
<td>605</td>
<td>341</td>
<td></td>
</tr>
</tbody>
</table>

Moving to the next modeling procedures, to ensure that the differences in Final models for EXT and MIXED dyads still held for the combined dataset, the last set of models (within group comparisons) were re-run. As summarized in Table 3.8, the models for the
combined dataset were identical to the Phase 2 only data, with the likelihood ratio chi-square values suggesting that the effects were strengthened by adding the pilot study data. It is interesting to note that, for the EXT dyads, the 3-way interaction with Lag0 X Lag1 X Period was deleted through the hierarchical procedure in the third step, $\Delta G^2 = 12.89, \Delta df = 9, p = .17$. Statistical methods have not been developed to directly test the significance of the difference between these values and those obtained for the same interaction term for the MIXED dyads, $\Delta G^2 = 31.58, \Delta df = 9, p = .0002$ (see Table 3.8); but it seems reasonable to suggest that the effect is a critical one for describing the pattern for MIXED, but not EXT dyads.

Having combined the datasets and ensured that the Final models for the EXT and MIXED groups were the same as those obtained from the Phase 2 data only, the next step was to examine the content of the group differences. To address the third research question regarding the specific dyadic interaction patterns that change, General log-linear (non-hierarchical) modeling was employed on the combined dataset. As mentioned previously, non-overlapped sampling was employed in order to parse each dyad members' actions (antecedent or lag0) and reactions (consequent or lag1). Thus, two models were fit to each group's data: one with child's behaviour considered as the antecedent and the parent as the consequent; and one with the reverse sequence. Adjusted residuals were examined to identify the particular parent-child transitions that significantly accounted for the fit in the Final models (shown in Figure 3.8). As recommended by Bakeman and colleagues (Bakeman & Gottman, 1997; Bakeman, 1992; Bakeman & Quera, 1995), adjusted residuals (i.e., the significance of any particular cell) should only be examined when the tablewise statistic (i.e., $G^2$) is large – this strategy is similar to the idea that post-hoc tests in analyses of variance should only be conducted when the omnibus $F$ ratio is significant. If the likelihood ratio chi-
Table 3.7 Joint frequencies and conditional probabilities for all combinations of Given – Target behaviours by Period and by Group

<table>
<thead>
<tr>
<th>Given</th>
<th>Target</th>
<th>EXT</th>
<th>MIXED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>C_Hostile →</td>
<td>P_Hostile</td>
<td>60 (.28)</td>
<td>14 (.12)</td>
</tr>
<tr>
<td></td>
<td>P_Negative</td>
<td>38 (.18)</td>
<td>29 (.25)</td>
</tr>
<tr>
<td></td>
<td>P_Neutral</td>
<td>94 (.44)</td>
<td>50 (.43)</td>
</tr>
<tr>
<td></td>
<td>P_Positive</td>
<td>23 (.11)</td>
<td>22 (.19)</td>
</tr>
<tr>
<td>C_Negative →</td>
<td>P_Hostile</td>
<td>13 (.48)</td>
<td>3 (.21)</td>
</tr>
<tr>
<td></td>
<td>P_Negative</td>
<td>10 (.37)</td>
<td>5 (.36)</td>
</tr>
<tr>
<td></td>
<td>P_Neutral</td>
<td>3 (.11)</td>
<td>5 (.36)</td>
</tr>
<tr>
<td></td>
<td>P_Positive</td>
<td>1 (.04)</td>
<td>1 (.07)</td>
</tr>
<tr>
<td>C_Neutral →</td>
<td>P_Hostile</td>
<td>44 (.19)</td>
<td>19 (.14)</td>
</tr>
<tr>
<td></td>
<td>P_Negative</td>
<td>37 (.16)</td>
<td>15 (.11)</td>
</tr>
<tr>
<td></td>
<td>P_Neutral</td>
<td>137 (.60)</td>
<td>82 (.61)</td>
</tr>
<tr>
<td></td>
<td>P_Positive</td>
<td>9 (.04)</td>
<td>19 (.14)</td>
</tr>
<tr>
<td>C_Positive →</td>
<td>P_Hostile</td>
<td>0 (.00)</td>
<td>0 (.00)</td>
</tr>
<tr>
<td></td>
<td>P_Negative</td>
<td>1 (.25)</td>
<td>1 (.14)</td>
</tr>
<tr>
<td></td>
<td>P_Neutral</td>
<td>3 (.75)</td>
<td>4 (.57)</td>
</tr>
<tr>
<td></td>
<td>P_Positive</td>
<td>0 (.00)</td>
<td>2 (.29)</td>
</tr>
<tr>
<td>P_Hostile</td>
<td>C_Hostile</td>
<td>63 (.53)</td>
<td>17 (.43)</td>
</tr>
<tr>
<td></td>
<td>C_Negative</td>
<td>12 (.10)</td>
<td>2 (.05)</td>
</tr>
<tr>
<td></td>
<td>C_Neutral</td>
<td>43 (.36)</td>
<td>21 (.53)</td>
</tr>
<tr>
<td></td>
<td>C_Positive</td>
<td>0 (.00)</td>
<td>0 (.00)</td>
</tr>
<tr>
<td>P_Negative →</td>
<td>C_Hostile</td>
<td>33 (.38)</td>
<td>29 (.59)</td>
</tr>
<tr>
<td></td>
<td>C_Negative</td>
<td>9 (.10)</td>
<td>6 (.12)</td>
</tr>
<tr>
<td></td>
<td>C_Neutral</td>
<td>42 (.49)</td>
<td>14 (.29)</td>
</tr>
<tr>
<td></td>
<td>C_Positive</td>
<td>2 (.02)</td>
<td>0 (.00)</td>
</tr>
<tr>
<td>P_Neutral →</td>
<td>C_Hostile</td>
<td>103 (.42)</td>
<td>45 (.32)</td>
</tr>
<tr>
<td></td>
<td>C_Negative</td>
<td>5 (.02)</td>
<td>5 (.04)</td>
</tr>
<tr>
<td></td>
<td>C_Neutral</td>
<td>133 (.55)</td>
<td>84 (.60)</td>
</tr>
<tr>
<td></td>
<td>C_Positive</td>
<td>3 (.03)</td>
<td>6 (.04)</td>
</tr>
<tr>
<td>P_Positive →</td>
<td>C_Hostile</td>
<td>19 (.63)</td>
<td>25 (.57)</td>
</tr>
<tr>
<td></td>
<td>C_Negative</td>
<td>1 (.03)</td>
<td>1 (.02)</td>
</tr>
<tr>
<td></td>
<td>C_Neutral</td>
<td>10 (.33)</td>
<td>17 (.39)</td>
</tr>
<tr>
<td></td>
<td>C_Positive</td>
<td>0 (.00)</td>
<td>1 (.02)</td>
</tr>
</tbody>
</table>
Table 3.8 Final models with phase 1 and 2 data combined

<table>
<thead>
<tr>
<th>Final log-linear modeling interaction</th>
<th>Δdf</th>
<th>ΔG²</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXT (n = 1645)b</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Partner X Lag0 X Lag1</td>
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<td>&lt;.0000</td>
</tr>
<tr>
<td>Lag0 X Period</td>
<td>3</td>
<td>21.93</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Lag1 X Period</td>
<td>3</td>
<td>21.12</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>MIXED (n = 1866)b</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lag0 X Lag1 X Period</td>
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<td>31.58</td>
<td>&lt;.0002</td>
</tr>
<tr>
<td>Partner X Lag0</td>
<td>3</td>
<td>164.51</td>
<td>&lt;.0000</td>
</tr>
<tr>
<td>Partner X Lag1</td>
<td>3</td>
<td>162.68</td>
<td>&lt;.0000</td>
</tr>
</tbody>
</table>

NOTE. *Values represent the change in df. G², and the p-level associated with this change if the interaction was deleted from the model. bSample size refers to the number of cases, not dyads.

Thus, adjusted residuals were obtained by fitting the model that was one step less complex than the final models obtained through the previous hierarchical procedure (shown in Table 3.8). In other words, this procedure asks: Why is the less complex model a poor fit? What cells deviate from the expected values and, thus, require a more complex model to explain the observed data? Similar to z-scores, adjusted residuals greater than |1.96|, |2.58|, and |3.30| are considered statistically significant at the .05, .01, and .001 level respectively.

Changes in MIXED dyads’ interaction patterns

Beginning with the MIXED dyads, it was hypothesized that parent-child transitions would change from a permissive pattern before the perturbation to a mutually hostile one after. In other words, a decrease in permissiveness and an increase in mutual hostility was expected to occur after the perturbation. Recall that permissiveness was operationalized as a two-event sequence in which the child was “negative” or “hostile” (Lag0) and the parent responded immediately (i.e., in the next conversational turn; Lag1) with a “neutral” or
"positive" behaviour. Thus, a decrease in permissiveness would be evident if the tendency for the parent to respond to the child's negative or hostile behaviour with a neutral or positive behaviour decreased from pre- to post-perturbation. Mutual hostility was operationalized as a two-event sequence in which one partner's hostile behaviour was followed immediately (i.e., in the next conversational turn; Lag1) with hostility from the other. Thus, an increase in mutual hostility would be evident if the parent's tendency to respond to the child's hostility in kind would increase from pre- to post-perturbation.

To test the third hypothesis, the next less complex model for the MIXED group, following the 3-way interaction (Lag0 X Lag1 X Period), was applied to the data. This model included all possible 2-way interactions plus main effects (lag0 X lag1 + lag0 X Period + lag1 X Period)^2. This "all 2-way" model was first applied to the contingency table representing the child at lag0 (antecedent) and the parent at lag1 (consequent). Given that this model did not fit the observed frequencies (n = 929), G^2 = 22.05, df = 8, p = .009, adjusted residuals could be examined for significance; they are presented in Figure 3.2. It is important to note that the adjusted residuals represent an effect size and the direction of change; they do not indicate an actual difference between two values. Because comparisons were made between only two levels of a factor (Period; pre- and post-perturbation), each pre-perturbation residual necessarily has an exact reciprocal value for post-perturbation. Thus, what is important to note first are any residuals that are higher than an absolute value of 1.96 and second, whether these residuals change from positive to negative (indicating a decrease) or if they show the opposite pattern.

Panel A shows that the decrease (after the perturbation) in the parent's neutral response to the child's hostility is statistically significant, p < .001 level. This result supports the hypothesis that permissiveness decreased for MIXED dyads in response to the
perturbation. Panel A also provides support for the hypothesis that mutual hostility increases after the perturbation for this group – the increase in parent’s hostility in response to child’s hostility is statistically significant, although the effect is not as strong.

In Panel B, a statistically significant increase in mutual negativity is shown, but no significant decrease in parent neutrality was found (although the direction of change was in the right direction). This finding is contrary to what was hypothesized; a decrease in permissiveness was defined as a decrease in the probability that the parent would respond neutrally to both the child’s hostility and negativity. But, as discussed in the next chapter, there may be good reasons to believe that parental response to the sorts of behaviours that were labelled “negative” in the current study was not an appropriate measure of permissiveness. The low base rate may be an additional reason to question the validity of this sequence. As shown in Table 3.6, the base rate of child negativity was very low, $\eta = 39$ (6%) pre-perturbation and $\eta = 22$ (6%) post-perturbation, compared to child hostility, $\eta = 285$ (47%) pre-perturbation and $\eta = 167$ (49%) post-perturbation. Thus, although the change in parental neutral response to child negativity was in the right direction, there may have not been enough power (especially post-perturbation) to reach significance.

Although there were no predictions made regarding parental responses to child’s neutral behaviours, the adjusted residuals in Panel C show some interesting patterns of response: the tendency for parent to respond neutrally in kind increases significantly, $p < .001$, whereas her tendency to initiate hostile or negative behaviours decreases. As shown in Panel D, no significant effects were found for changes in the parent’s response to child’s positivity; this was not surprising given children were positive very few times across all interactions, $\eta = 22$ (2%). Taken together, these results seem to support the hypothesis that

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1 Lower order factors or interactions (in this case, main effects) are always implied in log-linear analysis and not
Figure 3.2 Adjusted residuals for MIXED dyads when child's behaviour is considered the antecedent and parent's behaviour is the consequent. Adjusted residuals > 1.96, 2.58, and 3.30 are considered statistically significant at the *.05, **.01, and ***.001 level respectively. C_ = child's behaviour; P_ = parent's behaviour.

written conventionally.
Figure 3.3 Adjusted residuals for MIXED dyads when parent's behaviour is considered the antecedent and child's behaviour is the consequent. Adjusted residuals > |1.96|, |2.58|, and |3.30| are considered statistically significant at the *.05, **.01, and ***.001 level respectively. C_ = parent's behaviour; P_ = parent's behaviour.
permissiveness decreased and mutual hostility increased after the perturbation for MIXED dyads. In addition, the findings seem to point to an increase in contingent (i.e., of like kind) responding on the mother’s part, and not only in terms of mutual hostility. After the perturbation, parents’ tendency to respond with negativity towards their children’s negativity increased, as did their neutral responses to children’s neutral behaviours.

The same procedure was repeated for the contingency table representing parent at lag0 and child at lag1. The “all 2-way” model was applied again and showed a poor fit, ($n = 937), \chi^2 = 23.24, df = 9, p = .006$, thus, adjusted residual could be examined. Adjusted residuals are presented in Figure 3.3. In terms of the third hypothesis regarding an increase in mutual hostility, the main transition of interest when the child is considered the consequent (Lag1) is parent hostile $\rightarrow$ child hostile. Panel A shows a trend towards an increase in the child’s hostile response to the parent’s hostility (the adjusted residual = 1.95). Panel B shows an increase in negativity, and a decrease in neutrality, towards the parent’s negativity. Similar to the patterns found for parent at lag1, Panel C shows that the child’s contingently neutral responses to the parent’s neutral behaviours increase significantly ($p < .01$) and the child’s tendency to initiate hostility in the same context decreases significantly ($p < .01$). No significant changes were found in the child’s responses to the parent’s positive behaviours.

*Winnowing results to guard against Type I error*

Taken together, the significant adjusted residuals -- when parent or child’s behaviour is considered the antecedent -- seem to be consistent with the prediction that MIXED dyads shifted from a permissive to a mutually hostile pattern. Mutual negativity may also have been a common dyadic pattern after the perturbation. But there are two reasons to be wary of these results and to take steps to guard against the probability of Type I error. First, there were numerous comparisons made in the previous analyses. Second, as reviewed in the
Data Analysis section. adjusted residuals form an “interrelated web” (Bakeman & Quera, 1995) in that, when some are large, others must necessarily be small. Thus, it is not recommended to interpret each of the adjusted residuals individually. Bakeman and colleagues (Bakeman & Gottman, 1997; Bakeman & Quera, 1995) suggest using a “winnowing” procedure to test the importance of theoretically interesting transitions that are associated with significant adjusted residuals.

The procedure involved changing the observed frequencies in the cells of interest to structural zeros in the database. Then, the same model that was used to obtain the standardized residuals is re-tested. If the observed frequencies now adequately match the expected frequencies (i.e., if the $G^2$ is not significant), it can be concluded that those hypothesized cells indeed tapped the transitions that should be highlighted in the interpretation; if they do not match (i.e., if the $G^2$ remained significant), then further winnowing is recommended.

For the present study, the procedure involved “declaring” or changing the cells that represented the permissiveness and mutual hostility patterns — in the original 4 X 4 X 3 X 2 (lag0 X lag1 X Group X Period) contingency tables — to structural zeros. This was done separately for the tables that represented parent at lag0 and child at lag0. Then, the “all 2-way” model — the one that did not fit the observed frequencies — was re-applied to the altered tables and the subsequent fit was examined. If the model then showed an adequate fit, it could be concluded that the hypothesized transitions should indeed be emphasized in the interpretation of results.

Beginning with the table for child at lag0 and parent at lag1, two cells representing the permissive and mutual hostility transitions were declared structurally zero: child hostile → parent neutral; child hostile → parent hostile. Recall that when these cells were included, the “all 2-way” model did not fit the observed data, $G^2 = 22.05$, $df = 8$, $p = .009$ (see p. 46).
After the two cells were set to zero, results revealed an almost exact match between observed and expected frequencies, \( G^2 = 2.50, \text{df} = 12, p = .998 \). Thus, the findings strongly suggest that it was indeed the change in these two patterns that accounted for the statistical interaction between dyadic behaviour and period (lag0 X lag1 X Period).

The same procedure was run with the table representing parent at lag 0 and child at lag 1. This time, the cell that was set to zero was: parent hostile → child hostile, representing the mutual hostility transition. When this cell was previously included, the “all 2-way” model did not fit adequately, \( G^2 = 23.24, \text{df} = 9, p = .006 \); when they were subsequently set to zero, the model fit, but not very well, \( G^2 = 16.12, \text{df} = 10, p = .10 \). These findings suggest that the mutual hostility transition was important for explaining the observed frequencies, but that there may have been additional parent→child transitions that changed after the perturbation. Thus, as recommended by Bakeman and Gottman (1997), the winnowing procedure was continued by setting a second theoretically important cell to zero. The transition that was chosen has been commonly referred to as “child startup” (e.g., Patterson, Reid, & Dishion, 1992; Gottman, 1995) and refers to the sequence, parent neutral → child hostile. As shown in Panel C of Table 3.3, there is a significant standardized residual associated with the decrease in child’s hostility in response to parent’s neutral behaviour; in other words, child startup seems to decrease after the perturbation. After this third cell was set to zero and the “all 2-way” model was applied, there was a strong fit \( G^2 = 7.86, \text{df} = 12, p = .80 \). Thus, although these findings were exploratory and unpredicted, it seems that the decrease in child startup after the perturbation is an important shift to emphasize in interpreting the results.

**Changes in EXT dyad members’ individual behaviours**

Before proceeding to the adjusted residuals obtained for the EXT group, the conditional probabilities for this group (shown in Table 3.7) should be highlighted. Results
suggest that, after mutual neutrality, the most common parent-child sequence for EXT dyads is child hostile → parent neutral, one indication of the permissiveness pattern; unlike the MIXED group, this is true for both pre- and post-perturbation periods. Thus, as predicted, EXT dyads seem to be most likely to engage in a permissive pattern and to remain in this pattern even after being perturbed.

Moving to the modeling procedures, the Final model for the EXT group showed that there were no differences in parent-child (and child-parent) transitions before and after the perturbation (i.e., there was no Lag0 x Lag1 x Period interaction; see Table 3.8). Thus, there were no significant adjusted residuals that could be presented for changes in parent-child transitions from pre- to post-perturbation. However, changes in individual behaviours (unassociated with the other dyad member's behaviour), were found by Period for EXT (see Table 3.8 to review models). Based on the previous modeling procedures, however, it is not clear whether it was only the parent, only the child, or both dyad members that changed their behaviour. The content of these changes is also unclear. Thus, in order to examine the nature of individual dyad members' changes, the same strategy used for the MIXED group was applied; that is, a less complex model was fit to examine adjusted residuals. Because the "all 2-way" model was already found to fit the data for the EXT group, the even less complex model that included just 2 main effects (lag0 + Period) was tested. The model was applied twice – once to the parent data and again to the child's data.

First, the "2 main effects" model was applied to the data for parents in the EXT group; as expected, the model did not fit (n = 827), $\chi^2 = 18.51$, df = 3, $p < .0001$. When the same model was applied to the data for EXT children, the model unexpectedly did fit, although not very well (n = 818), $\chi^2 = 4.82$, df = 3, $p = .19$. These findings suggest that it was only the mother that changed her behaviour after the perturbation. Indeed, as shown in Figure 3.4, Panel B, there were no significant adjusted residuals associated with changes in
the child's behaviour. Panel A of the same figure clearly shows what accounted for the poor fit for the parent data: there is a highly significant increase in the parent's positivity after the perturbation ($p < .001$). There is also a decrease in the parent's hostility ($p < .05$). What is important to highlight here is that these changes were not based on any changes in the child's behaviour, nor did the parent's change alter the child's behaviour. These results reiterate the findings from the hierarchical procedure in which no significant 3-way interaction between dyadic behaviour and Period (lag0 X lag1 X Period) was found. Moreover, the results suggest that it is the mother's increase in positivity that explains the lag1 X Period and lag0 X Period interactions that were part of the Final model that fit (Table 3.8). Because only 4 comparisons were made, the winnowing procedure was not required.

![Figure 3.4](image-url)

**Figure 3.4.** Adjusted residuals for EXT showing changes in individual parent and child behaviours as a function of the perturbation. Adjusted residuals > $|1.96|$, $|2.58|$, and $|3.30|$ are considered statistically significant at the *.05, **.01, and ***.001 level respectively.
Question 4: Discontinuity in the profile of change after the perturbation

The last set of log-linear procedures was intended to address the fourth, DS-based research question: Was the change observed for the MIXED dyadic system a discontinuous one in response to the perturbation, or was it gradual over the entire problem-solving session? Although it may still be important that given enough time, subtypes will gradually become distinct in their parent-child interaction patterns, this was not the underlying premise of the present study. Instead, based on DS principles, it was hypothesized that subtypes would look similar until the dyadic system was perturbed, after which, interaction patterns would reorganize discontinuously. Thus, the following hierarchical modeling procedures were conducted to explicitly test the DS assumption that the perturbation induced a phase shift -- a non-continuous change -- in the MIXED dyadic system. Although no dyadic change after the perturbation was evident for EXT dyads, the analyses were also run on this group to examine any abrupt versus continuous changes in their individual behaviours.

The 6-minute problem-solving sessions were split into three equal 2-minute segments. The first 2 segments occurred pre-perturbation, the third segment was the post-perturbation segment. Non-overlapped sampling was once again used.

The hierarchical analyses paralleled the first set, but instead of comparing the Final models from pre- and post-perturbation periods, segments 1 and 2 were compared first (both pre-perturbation) and segments 2 and 3 were compared next (2 minutes before perturbation and 2 minutes after). Four factors were included in the saturated model that began the hierarchical procedure: Partner x Segment x Lag0 x Lag1. If dyadic change occurred only for MIXED dyads and that change was discontinuous due to the perturbation, then: (1) when only segments 1 and 2 are considered, Final models for both should show no 3-way interaction with Segment (lag0 X lag1 X Segment) and (2) when segments 2 and 3 are
compared, there should be a 3-way interaction with Segment only for the MIXED group.

As in the first set of hierarchical model-building, all Final models necessarily fit the data adequately; results are presented in terms of the interaction effects in the Final models and the change in $G^2$ if these interaction terms were deleted. Final models are presented in Table 3.9. The first half of Table 3.9 shows the comparisons between the 2 pre-perturbation segments. As predicted, there were no associations between parent-child transitions (Lag0 X Lag1) and Segment for any of the groups, indicating that dyadic interaction patterns remained stable across these two segments. In contrast, as shown in the second half of Table 3.9, an interaction between Lag0, Lag1 and Segment does emerge in the comparisons of Segments 2 and 3, and, as predicted, it is only evident for the MIXED group. Thus, the results suggest that the changes in MIXED dyadic patterns identified in the previous analyses (i.e., a decrease in permissiveness and an increase in mutual hostility) did not occur gradually across the interaction session; instead, these changes were discontinuous, occurring in response to the perturbation.

Returning to the comparisons between Segments 1 and 2, for all three groups, a 3-way interaction between Partner, Lag0 and Lag1 emerged. This effect can be interpreted in the following way: for all groups, the association between dyadic behaviour (Lag0 X Lag1) was related to which dyad member’s behaviour was considered to be the antecedent (Partner). Put another way, there was a predictable pattern of association between parent and child’s behaviour if the identity of the antecedent behaviour (i.e., parent or child) was known. But the main point to emphasize is that these associations did not vary according to Segment (i.e., they did not change between the first and second 2-minutes). The Segment main effect for the MIXED group simply means that there were more events in one Segment than in the other (if the events were of different kinds, there would be an interaction between Lag0 or Lag1 and Segment). Finally, the Partner X Lag1 X Segment interaction term found to be
significant for the EXT dyads means that one dyad member’s behaviour changes from the first to the second segment. Thus, in this case, the change for one dyad member was gradual over time and did not occur as a result of the perturbation.

Apart from the dyadic changes in the MIXED group, results from the comparisons between Segments 2 and 3 revealed changes for individual members in the EXT group. The Lag0 X Segment and Lag1 X Segment interaction terms for EXT dyads means that either one or both dyad members changed their own behaviour (independent of changes in the other member’s behaviour) after the perturbation. Again, from previous analyses (Figure 3.4), these interaction terms refer to the parent’s behavioural change.

Table 3.9 Final models testing differences between Segments by Group

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<tr>
<th>Final log-linear modeling interaction</th>
<th>Δdf^a</th>
<th>ΔG^2a</th>
<th>p^a</th>
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<td><strong>Segment 1 vs. 2 Comparisons</strong></td>
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</tr>
<tr>
<td>EXT (n = 990)^b</td>
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<td></td>
</tr>
<tr>
<td>Partner X lag0 X lag1</td>
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<td>45.71</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Partner X Lag1 X Segment</td>
<td>3</td>
<td>8.70</td>
<td>&lt;.03</td>
</tr>
<tr>
<td>MIXED (n = 1160)^b</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Partner X lag0 X lag1</td>
<td>9</td>
<td>20.71</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Segment</td>
<td>1</td>
<td>5.52</td>
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<tr>
<td><strong>Segment 2 vs. 3 Comparisons</strong></td>
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<tr>
<td>EXT (n = 1088)^b</td>
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</tr>
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<td>9</td>
<td>26.32</td>
<td>&lt;.002</td>
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<td>Lag0 X Segment</td>
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<td>Lag1 X Segment</td>
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<td>&lt;.0001</td>
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**NOTE.** ^aValues represent the change in df, G^2, and the p-level associated with this change if the interaction was deleted from the model. ^bSample size refers to the number of cases, not dyads.
3.5.4 State Space Grids

As explained in the Data Analysis section, to test differences between EXT and MIXED groups with the log-linear procedures, dyads' sequential data had to be combined within each group. Similar to most conventional statistical methods that aggregate subjects to test group differences, there is the possibility that differences were due to one or two outliers. But because of the multi-method analytic approach that was taken in the current study, this danger was minimized. In particular, the first approach that combined sequential analysis with a chi-square test was a case-based approach which did not aggregate subjects. Instead, the procedure basically entailed counting the number of dyads whose permissiveness probabilities increased/stayed the same or decreased, and cross-tabulating these numbers with group membership. The highly significant chi-square indicated that most MIXED dyads showed a typical pattern of decreasing permissiveness after the perturbation whereas most EXT dyads showed the opposite pattern. Because of some inherent limitations to this approach, log-linear modeling was conducted and the findings were supported and extended by the group-based procedures. Taken together, these two methods assure that the predicted results were not only significant at the group level but reflected typical parent-child patterns for most dyads.

In the final stage of the analyses, state space grids were constructed. Rather than using the grids as an exploratory tool to generate hypotheses (as was done in the pilot phase), the grids were used to visually illustrate the findings from the log-linear modeling. Similar to the strategy of presenting scatterplots for the purposes of clearly demonstrating the relations among variables, the grids provided a snapshot of the relations between parent and child behaviours. More importantly, they provided a graphical representation of characteristic dyadic patterns observed for each group.

State space grids were modified from the original ones used in the pilot phase so that
both parent and child behaviours could be considered as the antecedent and consequent (see Discussion in Chapter 2 regarding the limitations of the first method). An example of this new state space grid with a hypothetical trajectory representing six conversational turns is presented in Figure 3.5. The following six events were plotted: parent neutral, child hostile, parent neutral, child hostile, parent hostile, child hostile. In these grids, the parent’s behaviour is represented on the x-axis and the horizontal lines represent her conversational turns. The child’s behaviour is represented on the y-axis and vertical lines depict each of his conversational turns. Similar to the grids in the pilot phase, each point on the grid represents a two-event sequence (i.e., a dyadic state). The two shaded regions on the grid represent the regions of theoretical interest: mutual hostility and permissiveness.

**Figure 3.5** Example of a state space grid with a hypothetical trajectory
State space grids were constructed for all dyads, but for the purposes of presentation, four dyads from each group were randomly selected. Separate grids were developed for the pre- and post-perturbation periods. For the purposes of the current study, the lines (trajectories) are less important to notice than the cells in which behaviour tends to cluster. Figures 3.6 – 3.9 show four EXT dyads. These grids illustrate that dyads tended to go to the permissive region of the state space grid, as well as other regions (i.e., mutual neutrality and negativity) before the perturbation. Consistent with the log-linear findings, they also show that, after the perturbation, EXT dyads tended to remain in the permissive pattern. Figures 3.10 – 3.13 represent the interactions of four MIXED dyads. Like the grids for EXT dyads, the grids for the MIXED dyads show the various regions, including the permissive region, that dyads tended to occupy. But in the post-perturbation grids, the contrast with the EXT group becomes clear – the grids illustrate MIXED dyads’ tendency to move to the mutual hostility region of the state space grid.
Figure 3.10 MIXED dyad #14

Pre-perturbation

Post-perturbation

Figure 3.11 MIXED dyad #17

Pre-perturbation

Post-perturbation
Figure 3.12 MIXED dyad # 19

Figure 3.13 MIXED dyad #22
CHAPTER 4

General Discussion

4.1 Review of Objectives

The general objective of this dissertation was to examine the heterogeneous nature of aggressive youth – in particular, differences between MIXED and EXT subtypes with respect to parent-child interactions. In the first chapter, it was argued that examining the different parent-child relations that may be associated with each subtype may be critical for understanding the etiology and treatment of these youth. Thus, the current study was specifically concerned with identifying differences between subtypes of aggressive children in parent-child problem-solving interactions.

The final chapter will begin with a review of the design, research questions and hypotheses. Then, the main results pertinent to each question will be highlighted and contextualized within the broader research on parent-child interactions and childhood aggression. In the next section, the theoretical and methodological implications of these results will be discussed, followed by considerations regarding the clinical relevance of the findings. The chapter will conclude with a discussion of the limitations of the study and suggestions will be made for future research that could address these weaknesses. Given that all results in the pilot phase were replicated in the second, hypotheses-testing phase, and that data from the two phases were eventually combined, the following discussion will be organized around the findings from the latter phase.

For decades, scholars have recognized the fundamental heterogeneity of aggressive children, but very little empirical work has uncovered differences in underlying mechanisms that may account for this variability. In the current study, principles of dynamic systems were integral to studying this variability, both in terms of suggesting design strategies that can tap differences and for pointing to analytic techniques that can measure them. The study
was designed to compare MIXED and EXT children’s parent-child interactions. The standard problem-solving paradigm was used, with one design innovation – a perturbation was introduced part-way through the interaction. The perturbation – a knock on the door signaling the dyad to resolve the conflict – was designed to perturb the dyad by increasing the pressure for them to find a resolution quickly and to end in an affectively positive state. Past research had not convincingly distinguished subtypes’ parent-child interactions, perhaps because the context in which these patterns were observed was not varied to test for their stability. Thus, it was the dyads’ adjustment to the perturbation – the potential small change in contextual constraints – that was expected to distinguish subtypes.

Four research questions were examined: (1) Do subtypes differ in their parent-child interactions? (2) Can these differences be identified through the conventional problem-solving paradigm or are they better accessed by perturbing these interactions and observing dyad’s behavioural reorganization in response? (3) If dyads change their behavioural habits after the perturbation, what is the specific nature of this change for each subtype? (4) Is the change in dyadic patterns a discontinuous one, or is it gradual over the entire problem-solving session? It was hypothesized that dyads would differ in their parent-child interactions, but that these differences would only be identified after the perturbation. Based on the pilot data, it was further hypothesized that for the MIXED, but not EXT, group dyadic patterns would change – in response to the perturbation – from a permissive, to a mutually hostile pattern. Finally, this change was expected to be discontinuous in response to the perturbation, rather than gradual over the course of the problem-solving session.

4.2 Group differences in dyadic interactions

In terms of the first two research questions, it was hypothesized that MIXED and EXT dyads’ interaction patterns would differ, but only after the perturbation was introduced.
The results from the log-linear modeling procedures supported these predictions. The final model for the pre-perturbation period indicated no group differences in parent-child patterns. In contrast, group differences in interaction patterns were found for the post-perturbation period. These findings suggest that, without having perturbed the problem-solving session, subtypes of aggressive children and parents would not have been distinguishable from one another.

Only a small number of past studies have examined the possibility that unique parent-child processes may be one of the important factors underlying the emergence of combined externalizing and internalizing symptoms versus externalizing symptoms alone (Capaldi, 1991, 1992; Capaldi & Stoolmiller, 1999; Dadds, et al., 1992; Donnenberg & Weisz, 1997; Sanders, et al., 1992). All of these studies examined parent-child relations through the assessment of problem-solving discussions. The current results add support to the small number of studies which have identified differences between MIXED and EXT children's parent-child interactions (Dadds, et al., 1992; Donnenberg & Weisz, 1997; Sanders, et al., 1992), but they contradict those studies which have generally failed to find these differences (Capaldi, 1991, 1992; Capaldi & Stoolmiller, 1999). As suggested in the introduction, one explanation for the disparity between the results of these various studies may be that the observational data was analyzed at different levels of specificity. Unlike Capaldi (Capaldi, 1991, 1992; Capaldi & Stoolmiller, 1999) who used global ratings of parent-child interactions, Dadds, Sanders, and colleagues (Dadds, et al., 1992; Sanders, et al., 1992), similar to the current study, used a more fine-grained coding method which may have been more sensitive to previously undetected differences between MIXED and EXT children.

But this interpretation does not suffice to explain the current results. Within the context of the present study, group differences in parent-child interactions would not have been identified if the perturbation had not been included. It was only by attempting to
change, even slightly, the contextual constraints, and the behavioural contingencies that they imply, that dyadic subtypes became distinct. Transactional theorists have long been emphasizing the implications of varying interactional contexts in order to tap variability in behavioural outcomes (Brofenbrenner, 1979, 1986; Cicchetti, 1993; Hinde, 1992; Sameroff, 1983, 1995; Sroufe, 1989; 1997), but the current study is the first to empirically apply this insight to the study of aggressive subtypes.

4.3 Changes in the content of MIXED and EXT dyads’ interactions

Having established, with the first set of modeling procedures, that groups’ interaction patterns differed after the perturbation, the next step was to identify the specific nature of these differences. Based on the results from the pilot data, it was expected that both EXT and MIXED dyads would exhibit a permissive dyadic pattern before the perturbation. For EXT dyads, no change in dyadic patterns were expected after the perturbation; in contrast, MIXED dyads were expected to change to a mutually hostile pattern.

Results from the first (content-free) modeling of within group changes indicated that only the MIXED, and not the EXT, dyads changed their interaction patterns after the perturbation. By examining the statistical significance of the adjusted residuals obtained from the next set of modeling procedures, the particular content of these changes could be identified. In general, the pattern of significant adjusted residuals supported the prediction that MIXED dyads changed from a permissive, to a mutually hostile, pattern of interaction. Also consistent with the hypothesis, no dyadic changes were found for EXT dyads, although changes in the parent's behaviour were identified.

Beginning with the EXT dyads, as suggested by the fact that the child hostile → parent neutral sequence was the most probable both pre- and post-perturbation (after mutual neutrality), this group engaged in a permissive pattern throughout the problem-solving
session. As predicted, the modeling procedures showed no changes in dyadic interactions in response to the perturbation. The only change evident for this group was in the parent’s individual behaviour which became more positive and less hostile. These findings are consistent with many studies in the past that have found that permissiveness is a characteristic pattern for externalizing children and parents (e.g., Dumas & LaFreniere, 1993; Dumas & LaFreniere, 1995; Dumas et al., 1995; LaFreniere & Dumas, 1992; Patterson, 1982; Patterson et al., 1992; Snyder et al., 1994; Snyder et al., 1997). The current findings extend this past research by contrasting the EXT subtype with the patterns found for the MIXED subtype.

Moving to the MIXED group, a number of specific results should be highlighted. First, as predicted, dyads showed a decrease in the permissiveness pattern after the perturbation, as evidenced by the significant decrease in the parent’s tendency to respond to the child’s hostile behaviour with a neutral behaviour. Based on the operational definition, a decrease in permissiveness was also supposed to be evident from a decrease in the parent’s tendency to respond to her child’s negativity with neutrality. This prediction was not statistically borne out, although results were in the expected direction.

There are two reasons why parental response to child negativity, compared to child hostility, may not have worked as well in tapping the change in permissiveness. First, as mentioned in the results (p. 85), the base rate of child negativity was very low compared to child hostility; thus, there may have not been enough power to reach statistical significance. Given that the change in both parental neutral response to child hostility and child negativity was in the same direction, combining child negativity and hostility and calculating parental neutral response to this combined code probably would have yielded a significant decrease in the sequence.

In addition to the base rate problem, the second reason why child negative → parent neutral may not have been a good indicator of permissiveness may be due to the definition of
negativity in the current coding system. According to most researchers in the field (e.g., Baumrind, 1971; Dumas & LaFreniere, 1993; Dumas & LaFreniere, 1995; Dumas et al., 1995; LaFreniere & Dumas, 1992; Patterson, 1982; Patterson et al., 1992; Snyder et al., 1994; Snyder et al., 1997), permissiveness refers to the parent’s lack of appropriate limit-setting. This definition implies that there is an optimal level of control over the child that the parent should exert – particularly when the child is exhibiting oppositional and aggressive behaviours – and that this level of control is missing in these permissive interactions (e.g., Dumas & LaFreniere, 1993, 1995; Dumas et al., 1995; LaFreniere & Dumas, 1992). But in the current coding scheme, as described in the methods (p. 73), negative behaviours were distinguished from hostile ones by their lack of ill-intent towards the other (i.e., attacking or degrading behaviours). Perhaps because negative child behaviours (e.g., disagreeing) are not intended to be hurtful but seem to be integral to any problem-solving interaction, parental neutrality to such behaviours may not have been an indication of permissiveness.

The second predicted result that should be highlighted for the MIXED group is the statistically significant increase in mutual hostility, as indicated by an increase in the parent’s tendency to respond to her child’s hostility in kind. These results support past studies that have found mutual hostility to be a common pattern among aggressive dyads (e.g., Patterson, 1982; Patterson, Reid, & Dishion, 1992; Snyder et al., 1994; Snyder et al., 1997). But the current study also specifies that MIXED dyads may be more likely to engage in mutually hostile interchanges when there is a sudden urgency to resolve a conflict quickly and amiably.

Taken together, the findings indicate that both subtypes show a permissiveness pattern until they are perturbed, at which time, only MIXED dyads become mutually hostile; this pattern is consistent with past research that has identified these two dyadic patterns as characteristic of aggressive children and parents (e.g., Baumrind, 1971; Dumas & LaFreniere,
1993, 1995; Dumas et al., 1995; LaFreniere & Dumas, 1992; Patterson, 1982; Patterson et al., 1992; Snyder et al., 1994; Snyder et al., 1997). But as described in the rationale of the study, the primary goal was not to replicate these well-established patterns. Rather, the main contribution of this study was specifying for whom, and the conditions under which, these patterns are likely to emerge and change.

Although unpredicted, it seems important to consider an additional pattern of results. As mentioned briefly in the Results section, the findings for MIXED, and not EXT, dyads seem to point to an increase in contingent (i.e., of like kind) responding on the mother's part after the perturbation. This was evident not only by the increase in mutual hostility already discussed, but also by the increase in parent's tendency to respond with negativity towards her child's negativity and neutrally toward his neutral behaviours. These results seem to suggest that MIXED dyads exhibit a combination of interaction patterns that have previously been found to be characteristic of externalizing children on the one hand, and internalizing children on the other. According to Dumas and colleagues (e.g., Dumas & LaFreniere, 1993, 1995; Dumas, LaFreniere, & Serketich, 1995; LaFreniere & Dumas, 1992) the differences between internalizing and externalizing children's family interactions can be summarized as follows: unpredictable, indiscriminately positive parental responses to children's noncompliance lead to the development of childhood aggression, whereas predictably discriminate but intrusive and hostile parental behaviours lead to childhood anxiety.

Consistent with these authors' conceptualization of mothers of externalizing children, in the current study, it seems that mothers of MIXED children often responded indiscriminately (i.e., permissively) towards their children's noncompliance; this was evident in the pre-perturbation period. Interestingly, after the perturbation, mothers of MIXED children seemed to resemble parents with internalizing children more – MIXED mothers became discriminate and hostile. In comparison to EXT mothers who continued to engage in
the permissive pattern after the perturbation, MIXED mothers may have a shorter fuse. Thus, when MIXED mothers feel an increase in the pressure to control their non-compliant child, they may suddenly retaliate with their own hostility. This retaliation may be experienced as unpredictable by MIXED children. Although the child’s behaviour may not have escalated, the parent suddenly changed from responding in a passive way to becoming hostile in kind. Why might these mothers react in this way? Given that there is a small, but significant genetic influence in the development of anxiety (e.g., Rutter, MacDonald, Le Couteur, Harrington, Bolton, & Bailey, 1990), mothers of MIXED children may be predisposed to anxiety problems themselves. As a result of their potential genetic propensity, it may be that the perturbation triggered elevated levels of anxiety for MIXED mothers' and their sudden hostility was how they expressed these feelings (J. Jenkins, personal communication, July, 2000). Whatever the underlying cause, in terms of MIXED children’s etiology, they may feel unable to anticipate their mother’s erratic behaviour and, thus, they may experience high levels of anxiety during family conflicts. Over time, similarly repeated anxiety-provoking experiences may contribute to the development of serious internalizing symptoms that co-occur with externalizing problems in these children.

The post-perturbation interactions of MIXED dyads are also consistent with the "authoritarian" parenting patterns (i.e., harsh, hostile, and lacking in warmth) that have been found to relate to anxiety and aggression in children (Baumrind, 1971; 1991; Maccoby & Martin, 1983) and the punitive and belittling parental style related to childhood depression and aggression (Poznanski & Zrull, 1970). Thus, at least when considering parental behaviour, the parent-child relations of MIXED children seem to constitute a combination of patterns found in families with single-syndrome children. More importantly, this study is one among very few that has identified differences in interaction patterns between MIXED and EXT children and parents. In addition, the present findings suggest the conditions under
which each pattern might be observed – in less urgent, more relaxed problem-solving periods, MIXED dyads look like EXT dyads, but when the emotional pressure is increased slightly, their parent-child interactions may be more similar to those of pure internalizers.

But, so far, only the parent’s reactions to the child’s hostility has been the focus of interpretation. Following transactional theorists in general and Dumas and colleagues’ suggestions specifically (e.g., Dumas & LaFreniere, 1993; Dumas et al., 1995), the bidirectionality of parent-child relationships needs to be addressed by explicitly studying “relationships, rather than individuals [as] authoritative, permissive, or authoritarian” (Dumas et al., 1995, p. 112). The bidirectionality of parent-child interactions is particularly important to highlight given the results of the modeling procedures for MIXED dyads – it was not the parent’s individual behaviours that changed after the perturbation for MIXED dyads, but the interaction between parent and child behaviours. Thus, it seems equally critical to examine MIXED dyads’ parent-child relations from the perspective of the child responding to the parent’s antecedent behaviours.

The results from the modeling procedures when child behaviour is considered the response to parent’s behaviour yielded an interesting, although largely unpredicted, pattern of results. There was a strong trend towards an increase in mutual hostility after the perturbation, as indicated by an increase in the child’s tendency to respond to the parent’s hostility with hostility. But, perhaps more interestingly, there was a significant decrease after the perturbation in the child’s tendency to respond to the parent’s neutral behaviours with hostility. That is, there was a decrease in what is usually referred to in the literature as the probability of “child startup” (e.g., Patterson, et al., 1992; Gottman, 1995), or the probability of the child initiating a hostile exchange without provocation. After the perturbation, instead of responding to the parent’s neutrality with hostility, the child was significantly more likely
to respond with neutral behaviours. These results were unpredicted, but their implications may be important to consider nonetheless.

In Dumas and colleagues' "balance of power" terms, at the same time as the mother begins to respond more contingently (in like-kind) to her child's behaviour after the perturbation, the child is less likely to initiate control efforts. It may be that, for one or both dyad members, the perturbation triggered an urgency to resolve, a sense of "this is for real now." This change in context may have signaled the parent that it is time to reign in the child's controlling behaviours by responding with control efforts of her own; the child, on the other hand, may have been signaled that "mom's not going to let me get away with this anymore." These reciprocal signals may have initiated a feedback process in which each dyad member, monitoring the other's behaviour, shifted their own behaviour in response. Thus, when the parent was hostile, the child still responded mutually with hostility, but when she was neutral, he no longer seemed to initiate hostility. The parent, in turn, generally seemed to match the type of behaviours exhibited by her child.

At this stage, these interpretations are quite speculative; there were no measures of how the perturbation was appraised by either dyad member, nor were these particular patterns of results predicted. But the results do highlight the bidirectional nature of parent-child interactions and point to the complexity of considering any one dyad member's behaviour as either a cause or effect. These issues will be explored later in the section on limitations and future directions.

4.4 Discontinuity in the profile of change after the perturbation

The final research question was meant to address the implicit DS hypothesis that the dyadic change observed for MIXED dyads was discontinuous in response to the perturbation, rather than gradual over the course of the problem-solving session. As mentioned in the
Results section, subtypes’ parent-child interactions may become differentiated simply as a function of time. Although it would still be interesting if this were the case, this was not the underlying premise of the study design. Instead, based on DS principles, it was hypothesized that subtypes would look similar until the dyadic system was perturbed, after which, interaction patterns would reorganize discontinuously. Results supported the hypothesis. When the pre-perturbation session was split in half and the first segment was compared to the second, there were no differences found in interaction patterns for either group. But when the second segment before the perturbation was compared to the post-perturbation segment, differences indeed emerged – in dyadic patterns for the MIXED, and in individual behaviours for EXT, dyads. Thus, patterns did not change gradually over the first four minutes, but did so discontinuously in response to the perturbation.

4.5 Theoretical and Methodological Implications

There are three general implications of the present study. First, the current findings highlight the importance of recognizing the heterogeneity among aggressive youth and their families. This heterogeneity has long been recognized theoretically, but empirical investigations of aggressive parent-child relations rarely distinguish subgroups. Instead, aggressive children are often treated as a homogeneous group, lumped together, and compared to a ‘normal’ or psychiatric control group. In contrast, this study examined differences in subtypes’ dyadic relations and the results suggest that, indeed, MIXED and EXT children are distinct. Given that each subtype was related to characteristic patterns of parent-child interactions, these results provide further evidence for the validity of subtyping aggressive children on the basis of whether or not they also exhibit co-occurring internalizing symptoms.
A second implication of this study concerns the ways in which a self-organization approach allows researchers to examine structural differences in groups that were previously believed to be homogeneous. As mentioned earlier, without perturbing the dyadic system, subtypes' patterns of parent-child interactions would have been indistinguishable. This general DS principle may be applicable to a variety of phenomena in developmental psychopathology; that is, the notion that the optimal strategy for tapping the structure of a system is by perturbing it to test the stability of observed patterns and to examine the emergence of new ones.

Perhaps one of the most natural extensions of the current work is to apply the same strategy to potential subtypes of internalizing children. Recall from the introduction that researchers have not been able to adequately discriminate between children with depression and anxiety (e.g., Kazdin et al., 1983; M. L. Patterson et al., 1997; Saylor et al., 1984; Shoemaker et al., 1986; Wolfe et al., 1987). In terms of associated features and etiology, many authors have suggested that these children should be grouped under one internalizing category (e.g., Achenbach, 1991a; Achenbach et al., 1989; Gjone & Stevenson, 1997; Quay, 1986; Rutter & Garmezy, 1983; Weiss et al., 1997; Wolfe et al., 1987; Weiss & Catron, 1994; Weiss & Weisz, 1988; Werry, 1985; Wright et al., 1999). But perhaps by using some form of perturbation, internalizing children could be parsed into more specific subtypes. This perturbation could be applied to parent-child interactions or to individual children, for example, in the form of a standardized probe designed to increase the pressure on the child to perform optimally on a particular problem (cf. Phillips, 1996).

A third implication of the current study concerns its potential to preliminarily address, in part, Richters (1997) "developmentalists' dilemma"; that is, the gap between developmentalists' open systems models, which emphasize heterogeneous processes, and conventional research methods, generally appropriate for homogeneous phenomenon. The
multi-method analytic approach taken in the present study was an attempt to heed the call of several theorists (e.g., Hinde, 1992; Kagan, 1992; Keating, 1990; Keating & Miller, 2000; Richters, 1997; Sameroff, 1983) who have been arguing for research methods that show greater fidelity to the basic heterogeneous nature of developmental phenomena. As recommended by DeKlyen and colleagues (1999), the current study used analyses that maintained the integrity of the individual case (dyads in this case) and combined them with more established, group-based statistical techniques. A combination of sequential analysis, chi-square analysis, and state space grids were used to characterize each dyad and categorize interactions into two types. The results of these methods were subsequently reinforced and extended through log-linear modeling procedures, a group-based approach with a strong tradition of statistical integrity. Combining these two strategies provided a rigorous strategy that was sensitive to identifying variability as well as predictable patterns within that variability. The development of these and similar methodologies represents a preliminary step in bridging the gap between our complex developmental models and the techniques we use to test them.

4.6 Clinical Implications

In addition to the implications already discussed, there are several others related to clinical practice. This dissertation began by emphasizing the importance of early intervention with aggressive children and families. The question was asked, why does there continue to be such variability in treatment outcome after over fifty years of basic research and intervention studies on aggression and its family correlates? It was argued that one of the reasons may be that most treatment programs tend to work from the basis that there is one uniform causal process underlying childhood aggression, and interventions target that process
indiscriminately. But aggressive children are not a homogeneous group; thus, it is likely that the same treatment strategy will not impact on every aggressive child in the same way.

The results of this study suggest the need for targeting treatment strategies to match the different needs of MIXED and EXT subtypes and parents. As discussed in the introduction, the homogeneity assumption seems to be prevalent among clinical researchers studying the families of aggressive children; most clinical trial studies begin with the supposition that permissive family interactions are one of the central causal factors underlying childhood aggression. As indicated in the current results, this is certainly a critical family pattern to target in all aggressive dyads. But the current results suggests further specific recommendations for tailoring treatment strategies to the unique needs of each subtype.

Most empirically validated treatment programs with aggressive youth include, or are exclusively concerned with, a parenting skills training component (e.g., Barkley, 1997; Cunningham, Brenner, & Boyle, 1995; Eyber & Boggs, 1989; Forehand & McManhon, 1981; Hembree-Kigin & McNeil, 1995; Patterson et al., 1992; Phelan, 1995; Webster-Stratton, 1996) which provides instruction on how to interact more positively and discipline non-compliant behaviour more effectively. In addition to targeting the permissive pattern, most of these programs include several weeks of training parents to create a warm, affectively positive context in which the parent and child simply enjoy one another’s company (e.g., Barkley, 1997). But this strategy may be unwarranted for EXT dyads – mothers of EXT children seem to already spend a great deal of time responding positively or neutrally to their children, regardless of their child’s behaviour. In terms of my own and other clinicians’ impressions (T. J. Dishion, personal communication, August, 2000), mothers of EXT children seemed to have little difficulty spending positive time at home with their children; but they had a great deal of difficulty setting limits when their children began to
misbehave. On the other hand, given their propensity to slip into mutually hostile exchanges, MIXED dyads may benefit more from an emphasis on increasing mutually positive experiences. It may also be important to explicitly identify the contexts in which MIXED mothers tend to feel pressured to control their children. Perhaps by distinguishing those contexts in which MIXED dyads are more likely to engage in permissive versus mutually hostile patterns, in time, these contexts could be avoided or productively anticipated.

Another clinical implication to the current study, and a possible extension for future research, has to do with investigating more closely subtypes' characteristic parent-child interactions. In particular, it may be important to examine specific emotional behaviours. The emotional complexity evident in the videotapes of more than 60 parent-child interactions in this study were, for practical reasons, glossed over in the present study. It may be particularly interesting to examine the roles of shame and guilt and their link with anger versus reparative behaviours. These emotional dimensions seem especially important when considering the interactional differences between MIXED and EXT children. Specifically, it may be hypothesized that shame and guilt play a central organizing role in MIXED children's development and less of a role for EXT children. Problem-solving interactions with parents may provide a rich microcosm through which these ideas may be investigated. In terms of treatment process and outcome with subtypes of aggressive youth, shame, guilt and anger may be critical factors to consider. What sort of parent behaviours evoke shame and anger and do these contingencies vary across subtypes? Does treatment change these contingencies; for example, do parents learn to use guilt-inducing strategies to foster empathy and gain compliance? If so, do guilt-inducing strategies work differently for MIXED and EXT children? It may be that EXT children benefit from their parents use of reasoning, eliciting guilt and empathy, while the opposite may be true for MIXED children.
A third clinical implication can be framed in terms of applying the current methodology to future clinical research with aggressive subtypes. It may be important to extend these findings by examining the specific implications for treatment process and outcome. The exploratory state space grid methodology used to examine differences in interactions of aggressive subtypes should be able to tap distinct responses to the same treatment strategies. It may also allow for a closer look at the processes of change that underlie long-term treatment. We know little about how interactions on the micro-level actually change due to treatment. Is it the parent's hostile or indiscriminately positive behaviour that shifts? Does the child become less hostile, more assertive, or does he learn to attend more closely to others' intentions? Does the dyad as a whole become more flexible -- develop a larger behavioural repertoire -- or become inevitably entrenched in the same negative pattern? The response to treatment would be expected to be different for different subtypes of aggressive youth and parents, and to show up as unique trajectories on the state space grids.

Through this exploratory DS tool, baseline stable interaction patterns could be identified on a fine-grained level for each subtype. Changes in these patterns -- over the course of treatment and follow-up -- could be subsequently analyzed. Results could contribute to a more precise picture of heterogeneous parent-child interactions and their amenability to treatment. A better understanding of the relations among dyadic styles, treatment process, and outcome has implications for the refinement of existing treatments and the development of innovative strategies for less amenable subtypes.

4.7 Limitations and Future Research

There are a number of limitations to the present study that should be mentioned; each of them implies several new directions for future research. First, the study is limited due to
the relatively small sample size. Although 33 dyads is not unreasonably small, particularly for a fine-grained observational study, one third of this sample was part of a pilot stage in which hypotheses were generated. Clearly, to be confident in characterizing MIXED and EXT parent-child interactions, replication of the current findings in a larger sample is critical.

Second, the study focused on boys’ interactions with their mothers. Gender differences in problem-solving interactions could not be examined because there were very few girls referred to the treatment program from which boys were recruited. As a result, the interpretations of the data cannot be generalized to girls with externalizing problems. Past research has consistently found that girls’ aggression is predominately relational rather than physical in nature (e.g., Crick et al., 1999). Given that relational aggression requires at least a moderate level of communication and social skills, it is likely that different styles of problem-solving would emerge if girls were studied. It seems a worthwhile future project to study these interactions with girls and compare them to the present results. Moreover, there are no studies of which I am aware that have explicitly set out to compare EXT and MIXED girls. It may be that the risk factors, long-term outcomes, and causal mechanisms underlying comorbidity in boys are considerably different than those for girls. Fathers were also not included in this study; thus, the current findings speak only to patterns that may be typical for mothers with EXT and MIXED children.

A further limitation of this study concerns the possibility that the differences in interaction patterns of MIXED and EXT dyads do not represent ‘real’ syndromal differences; rather, they may reflect systematic respondent biases. It may be that the scores on the CBCL and TRF that were used to categorize subtypes of aggressive children actually represent MIXED parents’ own hostility which may manifest in their tendency to over-report clinical symptoms in their children. Given the sample size, there was not enough power to directly examine the extent to which respondent bias may have influenced the results.
Another limitation to the study seems to be the lack of information collected about mothers in the sample. There is a well-established connection between parental psychopathology, particularly depression, and child psychopathology (e.g., Cummings & Davies, 1992); thus, to get a more complete picture of MIXED and EXT parent-child interactions, it seems important to understand the parent’s symptomatology as well as the child’s. For example, it may be that parents of MIXED children are themselves clinically anxious. Parental anxiety may explain why the perturbation seemed to trigger these mothers to begin controlling their child’s oppositional behaviour; perhaps their reaction to the knock at the door was indicative of a heightened attunement to external evaluations and criticism. Thus, information on parental psychopathology seems like a viable first step in exploring more closely the mechanisms by which the perturbation “worked” for MIXED dyads, and did not impact on EXT dyads.

A fifth and related limitation concerns the lack of direct evidence regarding the nature of the perturbation. Results from this study suggest that something about the knock on the door and the experimenter’s instructions regarding that knock (i.e., “the signal to wrap up and end on friendly terms”) prompted MIXED, but not EXT, dyads to shift interaction patterns. Yet it remains unclear whether dyads experienced the knock as it was intended. The perturbation was meant to raise the emotional stakes of the problem-solving session, but there was no direct test of this design assumption. It seems important to unpack dyad members’ responses to the perturbation by directly assessing their emotional reactions and appraisals of the situation. One way to tap these appraisals in future research would be to use Levenson and Gottman’s (1983) video-recall method. In their study (and others), the researchers videotaped married couples’ problem-solving interactions and played the videos back to dyad members. While dyad members watched the tape, they were asked to remember how they felt at each moment and continuously turn a dial to indicate the intensity of their
emotions. A similar methodology could be used to examine in more detail the processes by which the perturbation impacted on dyads' interactions.

An additional, general consideration for the field concerns the issue of measurement and criteria differences. As discussed in the introduction (pp. 6 - 7), there is a great deal of variability among studies in the field in terms of the strategies used to establish clinical groups (e.g., categorical versus spectrum approaches) and the measurement tools that are employed to test group differences. In terms of the current study, for example, it is unclear whether the same observed differences would have been found if groups were formed on the basis of diagnoses derived from clinical interviews. It is also possible that if questionnaires rather than direct observations were used to assess differences in parent-child interaction patterns, the results would have been different from the ones currently interpreted.

Finally, the fact that the current study was conducted in a laboratory setting rather than a more naturalistic environment, and dyad members needed to be aware that they were being videotaped, is an additional issue that may limit the generalizability of the findings. Although, as mentioned previously, this methodology has been widely used to study aggressive parent-child interactions, it may still be the case that more naturally occurring interactions in the home would look different than the patterns observed in this study. For example, it seems reasonable to suggest that discussing the issue of bedtime in a laboratory setting is less emotionally charged than discussing the same issue at home while the child is refusing to turn off the television. It also seems the case that dyads may have felt self-conscious and judged while being videotaped and, thus, the patterns observed (at least to some degree) may have reflected dyads’ perceptions of what an “optimal” problem-solving session should look like. Despite these weaknesses, differences between MIXED and EXT dyads were indeed identified. Whether these differences in interaction patterns can be reliably replicated in a more naturalistic environment remains a question for future research.
References


APPENDIX A
CONSENT FORM for parents

It has been explained to me that Dr. Smith and Ms. Granic are conducting a study on treatment of aggression in children. I and my child agree to participate in the study. I understand that my child will receive routine clinical services at the Clarke Institute as indicated. In addition, my child will participate in an aggression treatment group and I will participate in a parenting skills program designed to teach skills that will help me manage my child’s anger and aggression problems.

The children’s groups will consist of 6-8 children, aged 6-12, referred to the Clarke Institute for treatment of aggressive behaviours. The groups will meet weekly for 16 consecutive weeks, with two mental health professionals as group leaders. The parent training groups will consist of 6-16 parents of aggressive children. The parent groups will meet at the same time as the children’s groups, for a total of 16 consecutive weeks. These groups will also be led by two mental health professionals. I understand that my child will be administered standardized measures of anger and aggression, other problem behaviours and emotions, social cognitions and skills, and self-esteem. Also, I will be asked to complete questionnaires about my child and myself and I will be requested to forward behaviour questionnaires to my child’s teacher. In addition, I will be asked to participate in a video-recorded activity with my child. This activity will involve my child and me talking about two identified areas of conflict for 20 minutes. I understand that I and/or my child may choose not to participate in these video-recorded activities and this will not affect our involvement in the parent and child treatment groups.

In the aggression treatment group, my child will participate in group therapy activities designed to reduce aggressive behaviours. I may be asked to assist my child in completing some minor homework assignments. As part of the parent training group, I will be introduced to some effective anger-management and behaviour modification strategies that may help my child become less aggressive. I will also learn about the techniques and strategies that my child will be taught in the children’s group.

I understand that there are several benefits to our participation in the project. My child will have the opportunity to meet and socialize with other young children, in a stimulating and structured environment. My child may learn something about how to control his/her angry feelings, and I may notice an improvement in his/her temper outbursts. I may also learn effective strategies that can help me help my child reduce his/her anger and aggression. Through our participation in the group, Dr. Smith and her colleagues will learn more about why young children become angry and aggressive, and about how to help children and their parents with these problems.

I understand that our participation will not affect any treatment we are receiving or receive from the Clarke Institute. I understand that we may withdraw from the study at any time. I also understand that my child may choose not to participate even though I have given my permission for my child to do so. I understand that the information collected will be stored in a computer database in an anonymous form and that only Ms. Granic and her authorized colleagues will have access to the information. Also, our privacy will be protected in any scientific publication or presentation resulting from this study.

I have had the opportunity to discuss any concerns I have about our participation in the study with Ms. Granic, and I acknowledge that I have been given a copy of this consent form.

Signature of Parent or Legal Guardian   Printed Name   Date

Name of Child   Witness

For further information, contact:
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Better understanding, prevention and care
Mieux comprendre - prévenir - soigner
APPENDIX B
CONSENT FORM for children aged 6-12

I understand that Dr. Smith and Ms. Granic are trying to find out what makes kids like me get mad and lose their temper. They want to find out what kids can do to try and stop themselves from getting so angry, and how they can control their tempers better. I sometimes have trouble controlling my temper, and I agree to help Dr. Smith and Ms. Granic learn more about what to do about it. I agree to come to the Clarke once a week for 16 weeks, and meet with Ms. Granic and/or the people she works with, along with some other kids who have problems controlling their temper. I understand that, in the group, we will do fun activities that will help us control our tempers. I might be asked to do a few activities at home. Also, I will do some activities and answer some questions that will help Dr. Smith and Ms. Granic understand how I think and feel. One of the activities will involve being videotaped while talking with my parent. In this activity, my parent and I will talk about things that bother us or make us angry. My parent(s) and my teacher will fill out some forms about how I act at home and at school. I understand that my parent(s) will come to their own group, with other parents, at the same time I come for my group. My parent(s) will learn some ways to help me with my temper, and will help about the kinds of things we’re learning in the kids’ group.

I understand that there are some good things about joining in the group. I will meet other kids who have trouble controlling their tempers, we will do some fun activities, and maybe I will learn something about how to stop myself from getting so angry. By being in the group, I will help Dr. Smith and Ms. Granic learn more about kids and angry feelings, so she will be able to help other kids.

I understand that, whether or not I decide to join in the group, I will get the same kind of help for my problems from the Clarke Institute. I know that I can decide at any time that I don’t want to come to the group anymore or participate in the videotaped activity with my parent, even if my parent(s) says it’s okay for me to come. I understand that any information about me will be stored in a computer and will not have my name on it. Only Ms. Granic and the people she works with will be able to see the information. My privacy will always be protected.

I have talked to Ms. Granic or one of her co-workers about the study, and I still want to come to the group and participate in the videotaped activities with my parent. I have been given a copy of this consent form.

_________________________________________  ___________________________________________
Signature                                        Printed Name

_________________________________________  ___________________________________________
Witness                                          Date

For further information, contact:
Isabel Granic, M.A.
Research Coordinator
Childhood Anger & Aggression Programme
Child Psychiatry
535-8501, 6220

Better understanding, prevention and care
Mieux comprendre - prévenir - soigner
APPENDIX C
I, ____________________________, hereby agree to permit the Clarke Institute of Psychiatry and any person(s) authorized by it to take and produce:

mark each applicable selection with an “X”

- audio recordings
- video recordings
- moving pictures
- photographs

of ___________________________ for the purpose of:

mark each applicable selection in part “A” and part “B” with an “X”

A) supervision/training of Clarke Institute staff and students
- research purposes:
- data collection
- publication

- discussion/presentation at professional and/or scientific meetings
- public relations
- (specify)

- other
- (specify)

B) N.B.: Recordings/pictures made for the following purposes will not be retained as part of a permanent medical record. Written documentation of the procedure in the medical record is required.

- assessment
- psychological testing
- assertiveness training
- sodium amytal interview
- evaluation of movement disorder
- other
- (specify)

I understand that:
- at no time will my surname and/or, when applicable, that of my child(ren), be revealed;
- material listed above will be used only for the purposes indicated;
- there is no time limit on the future use of the material listed above unless my consent is withdrawn; and,
- I may withdraw my consent at any time and this will in no way interfere with any treatment I and/or, when applicable, my child(ren) receive.

I understand the meaning and the implications of this document which have been explained to me by ____________________________

(name of Clarke Institute staff)

and give, of my own free will, my consent to the conditions listed above.*

witness signature

print name of witness

Dated this _______ day of ______________________, 19____.

Form 212 (revised 12/91)
APPENDIX D
# Child Behavior Checklist for Ages 4-16

**Child's Name**

**Sex**
- [ ] Boy
- [ ] Girl

**Age**

**Ethnic Group or Race**

**Today's Date**

**Child's Birthdate**

**Grade in School**

**Not Attending School**

Please fill out this form to reflect your view of the child's behavior even if other people might not agree. Feel free to write additional comments beside each item and in the space provided on page 2.

## I. Please list the sports your child most likes to take part in. For example: swimming, baseball, skating, skate boarding, bike riding, fishing, etc.

<table>
<thead>
<tr>
<th>Item</th>
<th>Compared to Other Children of the Same Age, About How Much Time Does He/She Spend in Each?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Don't Know</td>
</tr>
<tr>
<td>None</td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td></td>
</tr>
</tbody>
</table>

## II. Please list your child's favorite hobbies, activities, and games, other than sports. For example: stamps, dolls, books, piano, crafts, singing, etc. (Do not include listening to radio or TV.)

<table>
<thead>
<tr>
<th>Item</th>
<th>Compared to Other Children of the Same Age, About How Much Time Does He/She Spend in Each?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Don't Know</td>
</tr>
<tr>
<td>None</td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td></td>
</tr>
</tbody>
</table>

## III. Please list any organizations, clubs, teams, or groups your child belongs to.

<table>
<thead>
<tr>
<th>Item</th>
<th>Compared to Other Children of the Same Age, How Active Is He/She in Each?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Don't Know</td>
</tr>
<tr>
<td>None</td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td></td>
</tr>
</tbody>
</table>

## IV. Please list any jobs or chores your child has. For example: paper route, babysitting, making bed, etc. (Include both paid and unpaid jobs and chores.)

<table>
<thead>
<tr>
<th>Item</th>
<th>Compared to Other Children of the Same Age, How Well Does He/She Carry Them Out?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Don't Know</td>
</tr>
<tr>
<td>None</td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td></td>
</tr>
</tbody>
</table>

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1 S Prospect St., Burlington, VT 05401
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11-88 Edition
V. 1. About how many close friends does your child have? □ None □ 1 □ 2 or 3 □ 4 or more
(Do not include brothers & sisters)

2. About how many times a week does your child do things with friends outside of regular school hours?
(Do not include brothers & sisters) □ Less than 1 □ 1 or 2 □ 3 or more

VI. Compared to other children of his/her age, how well does your child:

- a. Get along with his/her brothers & sisters? □ Worse □ About Average □ Better □ Has no brothers or sisters
- b. Get along with other children?
- c. Behave with his/her parents?
- d. Play and work by himself/herself?

VII. 1. For ages 6 and older—performance in academic subjects: (If child is not being taught, please give reason)

- a. Reading, English, or Language Arts
- b. History or Social Studies
- c. Arithmetic or Math
- d. Science
- e. ____________________________
- f. ____________________________
- g. ____________________________

Other academic subjects—for example: computer courses, foreign language, business. Do not include gym, shop, driver's ed., etc.

- e. □ Falling □ Below average □ Average □ Above average
- f. □
- g. □

2. Is your child in a special class or special school? □ No □ Yes—what kind of class or school?

3. Has your child repeated a grade? □ No □ Yes—grade and reason

4. Has your child had any academic or other problems in school? □ No □ Yes—please describe
When did these problems start?

Have these problems ended? □ No □ Yes—when?

Does your child have any illness, physical disability, or mental handicap? □ No □ Yes—please describe

What concerns you most about your child?

Please describe the best things about your child:
Consider the following checklist for the past 6 months. Please circle 2 if the item is very true or often true of your child. Circle the 1 if the item is somewhat or sometimes true of your child. If the item is not true of your child, circle the 0. Please answer all items as well as you can, even if some do not seem to apply to your child.

<table>
<thead>
<tr>
<th>0 = Not True (as far as you know)</th>
<th>1 = Somewhat or Sometimes True</th>
<th>2 = Very True or Often True</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 1. Acts too young for his/her age</td>
<td>0 1 2 31. Fears he/she might think or do something bad</td>
<td></td>
</tr>
<tr>
<td>0 1 2 2. Allergy (describe):</td>
<td>0 1 2 32. Feels he/she has to be perfect</td>
<td></td>
</tr>
<tr>
<td>0 1 2 3. Argues a lot</td>
<td>0 1 2 33. Feels or complains that no one loves him/her</td>
<td></td>
</tr>
<tr>
<td>0 1 2 4. Asthma</td>
<td>0 1 2 34. Feels others are out to get him/her</td>
<td></td>
</tr>
<tr>
<td>0 1 2 5. Behaves like opposite sex</td>
<td>0 1 2 35. Feels worthless or inferior</td>
<td></td>
</tr>
<tr>
<td>0 1 2 6. Bowel movements outside toilet</td>
<td>0 1 2 36. Gets hurt a lot, accident-prone</td>
<td></td>
</tr>
<tr>
<td>0 1 2 7. Bragging, boasting</td>
<td>0 1 2 37. Gets in many fights</td>
<td></td>
</tr>
<tr>
<td>0 1 2 8. Can't concentrate, can't pay attention for long</td>
<td>0 1 2 38. Gets teased a lot</td>
<td></td>
</tr>
<tr>
<td>0 1 2 9. Can't get his/her mind off certain thoughts; obsessions (describe):</td>
<td>0 1 2 39. Hangs around with children who get in trouble</td>
<td></td>
</tr>
<tr>
<td>0 1 2 10. Can't sit still, restless, or hyperactive</td>
<td>0 1 2 40. Hears sounds or voices that aren't there (describe):</td>
<td></td>
</tr>
<tr>
<td>0 1 2 11. Clings to adults or too dependent</td>
<td>0 1 2 41. Impulsive or acts without thinking</td>
<td></td>
</tr>
<tr>
<td>0 1 2 12. Complains of loneliness</td>
<td>0 1 2 42. Likes to be alone</td>
<td></td>
</tr>
<tr>
<td>0 1 2 13. Confused or seems to be in a fog</td>
<td>0 1 2 43. Lying or cheating</td>
<td></td>
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<tr>
<td>0 1 2 14. Cries a lot</td>
<td>0 1 2 44. Bites fingernails</td>
<td></td>
</tr>
<tr>
<td>0 1 2 15. Cruel to animals</td>
<td>0 1 2 45. Nervous, highstrung, or tense</td>
<td></td>
</tr>
<tr>
<td>0 1 2 16. Cruelty, bullying, or meanness to others</td>
<td>0 1 2 46. Nervous movements or twitching (describe):</td>
<td></td>
</tr>
<tr>
<td>0 1 2 17. Day-dreams or gets lost in his/her thoughts</td>
<td>0 1 2 47. Nightmares</td>
<td></td>
</tr>
<tr>
<td>0 1 2 18. Deliberately harms self or attempts suicide</td>
<td>0 1 2 48. Not liked by other children</td>
<td></td>
</tr>
<tr>
<td>0 1 2 19. Demands a lot of attention</td>
<td>0 1 2 49. Constipated, doesn't move bowels</td>
<td></td>
</tr>
<tr>
<td>0 1 2 20. Destroys his/her own things</td>
<td>0 1 2 50. Too fearful or anxious</td>
<td></td>
</tr>
<tr>
<td>0 1 2 21. Destroys things belonging to his/her family or other children</td>
<td>0 1 2 51. Feels dizzy</td>
<td></td>
</tr>
<tr>
<td>0 1 2 22. Disobedient at home</td>
<td>0 1 2 52. Feels too guilty</td>
<td></td>
</tr>
<tr>
<td>0 1 2 23. Disobedient at school</td>
<td>0 1 2 53. Overeating</td>
<td></td>
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<tr>
<td>0 1 2 24. Doesn't eat well</td>
<td>0 1 2 54. Overtired</td>
<td></td>
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<tr>
<td>0 1 2 25. Doesn't get along with other children</td>
<td>0 1 2 55. Overweight</td>
<td></td>
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<tr>
<td>0 1 2 26. Doesn't seem to feel guilty after misbehaving</td>
<td>0 1 2 56. Physical problems without known medical cause:</td>
<td></td>
</tr>
<tr>
<td>0 1 2 27. Easily jealous</td>
<td>a. Aches or pains</td>
<td></td>
</tr>
<tr>
<td>0 1 2 28. Eats or drinks things that are not food - don't include sweets (describe):</td>
<td>b. Headaches</td>
<td></td>
</tr>
<tr>
<td>0 1 2</td>
<td>c. Nausea, feels sick</td>
<td></td>
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<tr>
<td>0 1 2</td>
<td>d. Problems with eyes (describe):</td>
<td></td>
</tr>
<tr>
<td>0 1 2 29. Fears certain animals, situations, or places, other than school (describe):</td>
<td>e. Rashes or other skin problems</td>
<td></td>
</tr>
<tr>
<td>0 1 2</td>
<td>f. Stomachaches or cramps</td>
<td></td>
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<tr>
<td>0 1 2</td>
<td>g. Vomiting, throwing up</td>
<td></td>
</tr>
<tr>
<td>0 1 2</td>
<td>h. Other (describe):</td>
<td></td>
</tr>
<tr>
<td>0 1 2 30. Fears going to school</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please see other side
<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
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</thead>
<tbody>
<tr>
<td>57.</td>
<td>Physically attacks people</td>
<td></td>
<td></td>
</tr>
<tr>
<td>58.</td>
<td>Picks nose, skin, or other parts of body (describe):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>59.</td>
<td>Plays with own sex parts in public</td>
<td></td>
<td></td>
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<tr>
<td>60.</td>
<td>Plays with own sex parts too much</td>
<td></td>
<td></td>
</tr>
<tr>
<td>61.</td>
<td>Poor school work</td>
<td></td>
<td></td>
</tr>
<tr>
<td>62.</td>
<td>Poorly coordinated or clumsy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>63.</td>
<td>Prefers playing with older children</td>
<td></td>
<td></td>
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<tr>
<td>64.</td>
<td>Prefers playing with younger children</td>
<td></td>
<td></td>
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<tr>
<td>65.</td>
<td>Refuses to talk</td>
<td></td>
<td></td>
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<tr>
<td>66.</td>
<td>Repeats certain acts over and over: compulsions (describe):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>67.</td>
<td>Runs away from home</td>
<td></td>
<td></td>
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<tr>
<td>68.</td>
<td>Screams a lot</td>
<td></td>
<td></td>
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<tr>
<td>69.</td>
<td>Secretive, keeps things to self</td>
<td></td>
<td></td>
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<tr>
<td>70.</td>
<td>Sees things that aren't there (describe):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>71.</td>
<td>Self-conscious or easily embarrassed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>72.</td>
<td>Sets fires</td>
<td></td>
<td></td>
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<tr>
<td>73.</td>
<td>Sexual problems (describe):</td>
<td></td>
<td></td>
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<tr>
<td>74.</td>
<td>Showing off or clowning</td>
<td></td>
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<tr>
<td>75.</td>
<td>Shy or timid</td>
<td></td>
<td></td>
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<tr>
<td>76.</td>
<td>Sleeps less than most children</td>
<td></td>
<td></td>
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<tr>
<td>77.</td>
<td>Sleeps more than most children during day and/or night (describe):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>78.</td>
<td>Smears or plays with bowel movements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>79.</td>
<td>Speech problem (describe):</td>
<td></td>
<td></td>
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<tr>
<td>80.</td>
<td>Stares blankly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>81.</td>
<td>Steals at home</td>
<td></td>
<td></td>
</tr>
<tr>
<td>82.</td>
<td>Steals outside the home</td>
<td></td>
<td></td>
</tr>
<tr>
<td>83.</td>
<td>Stores up things he/she doesn't need (describe):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>84.</td>
<td>Strange behavior (describe):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>85.</td>
<td>Strange ideas (describe):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>86.</td>
<td>Stubborn, sullen, or irritable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>87.</td>
<td>Sudden changes in mood or feelings</td>
<td></td>
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</tr>
<tr>
<td>88.</td>
<td>Sulks a lot</td>
<td></td>
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<tr>
<td>89.</td>
<td>Suspicious</td>
<td></td>
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<tr>
<td>90.</td>
<td>Swearing or obscene language</td>
<td></td>
<td></td>
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<tr>
<td>91.</td>
<td>Talks about killing self</td>
<td></td>
<td></td>
</tr>
<tr>
<td>92.</td>
<td>Talks or walks in sleep (describe):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>93.</td>
<td>Talks too much</td>
<td></td>
<td></td>
</tr>
<tr>
<td>94.</td>
<td>Teases a lot</td>
<td></td>
<td></td>
</tr>
<tr>
<td>95.</td>
<td>Temper tantrums or hot temper</td>
<td></td>
<td></td>
</tr>
<tr>
<td>96.</td>
<td>Thinks about sex too much</td>
<td></td>
<td></td>
</tr>
<tr>
<td>97.</td>
<td>Threatens people</td>
<td></td>
<td></td>
</tr>
<tr>
<td>98.</td>
<td>Thumb-sucking</td>
<td></td>
<td></td>
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<tr>
<td>99.</td>
<td>Too concerned with neatness or cleanliness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100.</td>
<td>Trouble sleeping (describe):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>101.</td>
<td>Truancy, skips school</td>
<td></td>
<td></td>
</tr>
<tr>
<td>102.</td>
<td>Underactive, slow moving, or lacks energy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>103.</td>
<td>Unhappy, sad, or depressed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>104.</td>
<td>Unusually loud</td>
<td></td>
<td></td>
</tr>
<tr>
<td>105.</td>
<td>Uses alcohol or drugs for nonmedical purposes (describe):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>106.</td>
<td>Vandalism</td>
<td></td>
<td></td>
</tr>
<tr>
<td>107.</td>
<td>Wets self during the day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>108.</td>
<td>Wets the bed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>109.</td>
<td>Whining</td>
<td></td>
<td></td>
</tr>
<tr>
<td>110.</td>
<td>Wishes to be of opposite sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>111.</td>
<td>Withdrawn, doesn't get involved with others</td>
<td></td>
<td></td>
</tr>
<tr>
<td>112.</td>
<td>Worrying</td>
<td></td>
<td></td>
</tr>
<tr>
<td>113.</td>
<td>Please write in any problems your child has that were not listed above:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PLEASE BE SURE YOU HAVE ANSWERED ALL ITEMS.**

**UNDERLINE ANY YOU ARE CONCERNED ABOUT.**
APPENDIX E
Your answers will be used to compare the pupil with other pupils whose teachers have completed similar forms. The information from this form will also be used for comparison with other information about this pupil. Please answer as well as you can, even if you lack full information. Scores on individual items will be combined to identify general patterns of behavior. Feel free to write additional comments beside each item and in the space provided on page 2.

PUPIL’S NAME

PUPIL’S SEX □ Boy □ Girl

PUPIL’S AGE

ETHNIC GROUP OR RACE

TODAY’S DATE

PUPIL’S BIRTHDATE (if known)

Mo. Date Yr. Mo. Date Yr.

GRADE IN SCHOOL

NAME OF SCHOOL

I. How long have you known this pupil?_________ months


III. How much time does he/she spend in your class per week?

IV. What kind of class is it? (Please be specific, e.g., regular 5th grade, 7th grade math, etc.)

V. Has he/she ever been referred for special class placement, services, or tutoring?
   □ Don’t Know 0. □ No 1. □ Yes—what kind and when?

VI. Has he/she ever repeated a grade?
   □ Don’t Know 0. □ No 1. □ Yes—grade and reason

VII. Current school performance—list academic subjects and check appropriate column:

<table>
<thead>
<tr>
<th>Academic subject</th>
<th>1. Far below grade</th>
<th>2. Somewhat below grade</th>
<th>3. At grade level</th>
<th>4. Somewhat above grade</th>
<th>5. Far above grade</th>
</tr>
</thead>
<tbody>
<tr>
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"Copyright 1988 Thomas M. Achenbach Center for Children, Youth, & Families University of Vermont 1 South Prospect St. Burlington, VT 05401"
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<tr>
<td>1. How hard is he/she working?</td>
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<td>2. How appropriately is he/she behaving?</td>
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<td>3. How much is he/she learning?</td>
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<td>4. How happy is he/she?</td>
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<td>IX. Most recent achievement test scores (If available):</td>
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<td>Name of test</td>
<td>Subject</td>
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<td>Percentile or grade level obtained</td>
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<td>X. IQ, readiness, or aptitude tests (If available):</td>
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<tr>
<td>Name of test</td>
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<td>IQ or equivalent scores</td>
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</tbody>
</table>

Does this pupil have any illness, physical disability, or mental handicap?  □ No  □ Yes – please describe

What concerns you most about this pupil?

Please describe the best things about this pupil:

Please feel free to write any comments about this pupil's work, behavior, or potential, using extra pages if necessary.
Below is a list of items that describe pupils. For each item that describes the pupil now or within the past 2 months, please circle the number to indicate its truth value according to how true the item is:

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Code</th>
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<tbody>
<tr>
<td>0</td>
<td>Not True (as far as you know)</td>
<td>1</td>
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<tr>
<td>1</td>
<td>2. Argues a lot</td>
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<td>2</td>
<td>3. Fails to finish things he/she starts</td>
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<td>3</td>
<td>4. Frowns or makes other odd noises in class</td>
<td>0</td>
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<td>4</td>
<td>5. Behaves like opposite sex</td>
<td>0</td>
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<td>5</td>
<td>6. Defiant, talks back to staff</td>
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<td>6</td>
<td>7. Bragging, boasting</td>
<td>0</td>
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<td>7</td>
<td>8. Can't concentrate, can't pay attention for long</td>
<td>0</td>
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<tr>
<td>8</td>
<td>9. Can't get his/her mind off certain thoughts; obsessions (describe):</td>
<td>0</td>
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<td></td>
<td>10. Can't sit still, restless, or hyperactive</td>
<td>0</td>
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<td>11</td>
<td>11. Clings to adults or too dependent</td>
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<tr>
<td>12</td>
<td>12. Complains of loneliness</td>
<td>0</td>
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<tr>
<td>13</td>
<td>13. Confused or seems to be in a fog</td>
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<tr>
<td>14</td>
<td>14. Cries a lot</td>
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<tr>
<td>15</td>
<td>15. Fidgets</td>
<td>0</td>
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<tr>
<td>16</td>
<td>16. Cruelty, bullying, or meanness to others</td>
<td>0</td>
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<tr>
<td>17</td>
<td>17. Daydreams or gets lost in his/her thoughts</td>
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<tr>
<td>18</td>
<td>18. Deliberately harms self or attempts suicide</td>
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<td>19</td>
<td>19. Demands a lot of attention</td>
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<tr>
<td>20</td>
<td>20. Destroys his/her own things</td>
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<tr>
<td>21</td>
<td>21. Destroys property belonging to others</td>
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<td>22</td>
<td>22. Difficulty following directions</td>
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<td>23</td>
<td>23. Disobedient at school</td>
<td>0</td>
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<tr>
<td>24</td>
<td>24. Disturbs other pupils</td>
<td>0</td>
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<td>25</td>
<td>25. Doesn't get along with other pupils</td>
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<td>26</td>
<td>26. Doesn't seem to feel guilty after misbehaving</td>
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<tr>
<td>27</td>
<td>27. Easily jealous</td>
<td>0</td>
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<tr>
<td>28</td>
<td>28. Eats or drinks things that are not food—don't include sweets (describe):</td>
<td>0</td>
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<tr>
<td>29</td>
<td>29. Feared certain animals, situations, or places other than school (describe):</td>
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<td>30</td>
<td>30. Feared going to school</td>
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Please be sure you have answered all items.
APPENDIX F
ISSUES CHECKLIST

Child’s Name: ____________________________

Date: ____________________________

Who is completing this questionnaire? □ Parent  ☑ Child

INSTRUCTIONS

Below is a list of things that sometimes get talked about at home. We would like you to look carefully at each topic on the left-hand side of the page and decide whether the two of you together have talked about that topic at all during the last 2 weeks.

If the two of you together have discussed it during those 2 weeks, indicate YES to the right of the topic. If the two of you together have not discussed it during those 2 weeks, indicate NO to the right of the topic.

Now we would like you to go back over the list of topics. For those topics for which you indicated YES, please answer the two question on the right-hand side of the page.

1. How many times during those 2 weeks did the topic come up (just estimate)?
2. How hot were the discussions (how angry did you both get)?

<table>
<thead>
<tr>
<th>Topic</th>
<th>Did You Talk About It On The Last 2 Weeks</th>
<th>How Many Times</th>
<th>How Hot The Discussion Was</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Telephone calls</td>
<td>O YES O NO</td>
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<tr>
<td>2. Time for going to bed</td>
<td>O Y O N</td>
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<tr>
<td>3. Cleaning up bedroom</td>
<td>O Y O N</td>
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<tr>
<td>4. Doing homework</td>
<td>O Y O N</td>
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<tr>
<td>5. Putting away clothes</td>
<td>O Y O N</td>
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<td>6. Watching television</td>
<td>O Y O N</td>
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<td>7. Cleanliness (washing, showers, brushing teeth, etc.)</td>
<td>O Y O N</td>
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<tr>
<td>8. Which clothes to wear</td>
<td>O Y O N</td>
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<tr>
<td>9. How neat clothing looks</td>
<td>O Y O N</td>
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<tr>
<td>10. Making too much noise at home</td>
<td>O Y O N</td>
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<tr>
<td>11. Table manners</td>
<td>O Y O N</td>
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<tr>
<td>12. Fighting with brothers or sisters</td>
<td>O Y O N</td>
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<td>13. Cursing</td>
<td>O Y O N</td>
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<td>14. How money is spent</td>
<td>O Y O N</td>
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<tr>
<td>15. Picking books and movies</td>
<td>O Y O N</td>
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<tr>
<td>16. Allowance</td>
<td>O Y O N</td>
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<tr>
<td>17. Playing stereo or radio too loudly</td>
<td>O Y O N</td>
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<tr>
<td>TOPIC</td>
<td>DID YOU TALK ABOUT IT IN THE LAST 2 WEEKS?</td>
<td>HOW MANY TIMES?</td>
<td>HOW HOT WERE THE DISCUSSIONS?</td>
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<td>------------------------------------------------------------</td>
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<tr>
<td>18. Turning off lights in house</td>
<td>O Y O N</td>
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<td>0 1 0 2 0 3 0 4 0 5</td>
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<tr>
<td>19. Taking care of games, toys and things</td>
<td>O Y O N</td>
<td></td>
<td>0 1 0 2 0 3 0 4 0 5</td>
</tr>
<tr>
<td>20. Buying records, games, toys and things</td>
<td>O Y O N</td>
<td></td>
<td>0 1 0 2 0 3 0 4 0 5</td>
</tr>
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<td>21. What kind of friends to have</td>
<td>O Y O N</td>
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<td>0 1 0 2 0 3 0 4 0 5</td>
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<tr>
<td>22. Selecting new clothing</td>
<td>O Y O N</td>
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<td>0 1 0 2 0 3 0 4 0 5</td>
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<tr>
<td>23. Coming home on time</td>
<td>O Y O N</td>
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<td>0 1 0 2 0 3 0 4 0 5</td>
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<tr>
<td>24. Getting to school on time</td>
<td>O Y O N</td>
<td></td>
<td>0 1 0 2 0 3 0 4 0 5</td>
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<tr>
<td>25. Getting low grades in school</td>
<td>O Y O N</td>
<td></td>
<td>0 1 0 2 0 3 0 4 0 5</td>
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<tr>
<td>26. Getting in trouble in school</td>
<td>O Y O N</td>
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<td>0 1 0 2 0 3 0 4 0 5</td>
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<tr>
<td>27. Lying</td>
<td>O Y O N</td>
<td></td>
<td>0 1 0 2 0 3 0 4 0 5</td>
</tr>
<tr>
<td>28. Helping out around the house</td>
<td>O Y O N</td>
<td></td>
<td>0 1 0 2 0 3 0 4 0 5</td>
</tr>
<tr>
<td>29. Talking back to parents</td>
<td>O Y O N</td>
<td></td>
<td>0 1 0 2 0 3 0 4 0 5</td>
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<tr>
<td>30. Getting up in the morning</td>
<td>O Y O N</td>
<td></td>
<td>0 1 0 2 0 3 0 4 0 5</td>
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<tr>
<td>31. Bothering parent(s) when they want to be left alone</td>
<td>O Y O N</td>
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<td>0 1 0 2 0 3 0 4 0 5</td>
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<tr>
<td>32. Bothering child when he/she wants to be left alone</td>
<td>O Y O N</td>
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<td>0 1 0 2 0 3 0 4 0 5</td>
</tr>
<tr>
<td>33. Putting feet on furniture</td>
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<td>34. Messing up the house</td>
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<td>35. What time to have meals</td>
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<td>36. What to have for meals</td>
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<td>37. How to spend free time</td>
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<td>38. Talking back to teachers</td>
<td>O Y O N</td>
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<tr>
<td>39. Getting into fights</td>
<td>O Y O N</td>
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<tr>
<td>40. Other?</td>
<td>O Y O N</td>
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