The Influence of Goal-Orientation on Parent-Child Affect During a Problem-Solving Task

by

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

Background. When children experience positive affect, their attentional frame is broadened, building flexible thinking. During collaborative activities with parents, there are opportunities for children to express positive affect. However, parental goal orientation may influence whether both parents and children express or elicit positive affect. Understanding how parental goal-orientation influences individual and shared expressions of parent and child affect may provide novel insights into how dyadic affective dynamics support early learning.

Objectives. The goal of this study was to 1) examine the association between parents' goal orientation (process versus outcome) and the frequency of a parent's own, and their child's, affect expressions (positive, negative, and neutral), and 2) examine the relation between parental goal orientation (process versus outcome) and the frequency of instances of shared positive affect within the dyad. It was hypothesized that when parents were assigned to a process-oriented condition, both parents and children would express more positive affect, less negative affect, and at the level of the dyad increased instances of *shared* positive affect, relative to parents and children in an outcome-oriented condition.

Methods. Data were leveraged from a larger study examining parents' goal orientation, joint attention, and dyadic interactions (N = 160; 80 dyads; child M_{age} = 4.43). Parents were randomly assigned to a process ("focus on your child's learning experience") or an outcome ("focus on getting the puzzles done") oriented condition before working on a series of puzzles for eight minutes. Parent and child affect were coded second by second using Mangold INTERACT software.

Results. Across conditions, both parents and children demonstrated predominantly neutral affect (i.e., > 80%) while they worked on the task, $F(2, 156) = 8363.31$, $p < .001$. However, a

significant three-way interaction between condition, role, and affect emerged, $F(2, 156) = 4.50$, $p = .013$. Follow-up analyses showed that parents expressed significantly more positive affect than children, but only in the outcome-oriented condition. Consistent with the findings at the level of the individual, dyads displayed comparable and limited instances of shared positive affect in both the process-oriented ($M = 1.95\%$) and outcome-oriented ($M = 1.57\%$) conditions as dyads spent the vast majority of their time in a state of shared neutral affect.

Implications. This study highlights the role of parental goal-orientation on affective exchanges within parent-child interactions and suggests that an outcome-oriented approach may be associated with slight increases in parents' positive affect expressions relative to the child, during learning tasks. However, there was limited power to detect these effects given the extremely low frequency of *any* positive expressions during the learning task. Alternate analytic methods, such as temporal analyses examining sequences of shifts between neutral, positive, and negative affect between parents and children, may provide more information about the associations between parent goal-orientations, dyad affective exchanges, and children's early learning.

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Table of Contents

Author's Declaration ..... **ii**

Abstract ..... **iii**

Acknowledgements ..... **v**

List of Figures ..... **viii**

Introduction **1**

Broaden-and-Build Theory and Importance of Positive Affect 2

Shared Affect 4

Parental Goal-Orientation 5

Current Study 7

Method **9**

Participants 9

Procedure 9

Emotion Coding 10

Inter-Rater Reliability 11

Data Cleaning and Reduction 11

Data Analysis Plan 12

Results **14**

Overview 14

Hypothesis 1: Influence of Goal-Orientation on Individual Expressions of Affect 14

Hypothesis 2: Influence of Goal-Orientation on Shared Expressions of Positive Affect 16

Patterns of Dyadic Shared Emotional Expressions 16

Discussion 17

Overexpression of Neutral Affect 17

Differences in Parent and Child Individual Affect Expression 18

The Importance of Timing: Shared Affect 19

Contributions to the Broaden & Build Theory 21

Future Directions 22

Conclusion 22

References 24

Appendices 38

Appendix A 38

Appendix B 40

List of Figures

Figure 1. Parent and child affect by goal-orientation condition 40

Figure 2. Mean proportion of shared positive affect by goal-orientation 41

Figure 3. Parent-child shared affect by condition 42

Introduction

During development, social interactions shape how children learn across many different domains (e.g., language, social, and cognitive) (Denham, 2007; Junge et al., 2020; Aya & Shigeki, 2022; Soto-Icaza et al., 2015; Wesarg-Menzel et al., 2023). Specifically, parent-child interactions shape how children attend to aspects of their environment, encode and retain information (Leichtman et al., 2017), and problem solve. Various parental factors such as scaffolding, responsiveness, parenting styles, and parents' own goals (Schwebel et al., 2016; Darling & Steinberg, 2017; Weltevreden et al., 2018) have been shown to influence how children interact and engage with others (Hardiansyah et al., 2024; Mermelshtine, 2017). When parents and children navigate challenges during these interactions, the affective dynamics within the dyad can influence the development of cognitive and social skills, the quality of the interaction, and the children's engagement (Çakır et al., 2025). These affective dynamics include the frequency of each individual's affective expressions, as well as instances of shared affect within the dyad. Since affect expressions are continuous, these exchanges shape the moment-to-moment nature of parent-child interactions creating opportunities for shared affective experiences (Butler, 2015; Avry et al., 2020; Kroczek et al., 2024). To-date, the majority of the literature on dyadic influences on early learning have focused on parents and children's observable behaviours; with less attention on other factors including parent motivation or goal-orientation that may play a critical role in shaping affect within an interaction. Specifically, parents' own motivations and goals within various learning contexts may shape how they direct learning tasks, and how they emotionally react in challenging situations. Therefore, the goal of this thesis was to examine the influence of parental goal-orientation on individuals' expressions of affect, as well as instances of shared positive affect within parent-child dyads during a problem-solving task.

Broaden-and-Build Theory and Importance of Positive Affect

Positive affect including emotions such as happiness, joy, and love may impact a child's learning and development. According to the Broaden-and-Build Theory, when individuals experience or express positive emotions, their attentional frame is broadened allowing for more flexible and creative thinking, ultimately building social and cognitive skills that support problem-solving, relationship building, and foster resilience (Fredrickson, 2001; Greene & Noice, 1988). A study conducted by Fredrickson and colleagues (2005) demonstrated this effect when they induced positive, negative, or neutral emotions from university students by having them view emotion-eliciting video clips (e.g., penguins waddling intended to induce positive emotions). In line with the Broaden-and-Build theory, participants who experienced positive affect exhibited a broader attentional frame indexed by higher scores on a visual processing task, compared to those induced to experience neutral or negative affect. Similarly, Rowe et al. (2007) examined the effects of induced positive emotions (e.g., positive images paired with listening to cheerful music) on attentional scope among university students, using a series of selective attention and semantic problem-solving measures. Those who experienced positive emotions demonstrated broader attention as they attended to increased stimuli during a selective attention task, compared to those experiencing neutral and negative affect (Rowe et al., 2007). This suggests that positive affect may enable individuals to broaden their attentional scope and therefore cognitively process more information, in comparison to negative affect (e.g., anger, frustration) that functions to narrow attention and decrease cognitive flexibility (Filipiak & Hawrot, 2024; Decarli et al., 2025; Zhu & Leng, 2025). Throughout a child's development, these broadened attentional states presumably allow for greater growth in cognitive and social capacities that underlie learning (Werchan et al., 2025; Stifter et al., 2019).

To-date, most of the work has examined the effects of positive affect on attention and information processing at the individual level, however positive emotions are frequently expressed during social interactions with others, including within parent-child interactions. Within this framework, there is much less knowledge about how positive affect is expressed within dyads, and how those *dyadic* exchanges affect attentional scope later on. In early learning environments, parents and children continually exchange and coordinate their affective expressions (Butler & Randall, 2012). The Broaden-and-Build framework suggests that children and parents who express positive affect during problem solving, play, and exploration, may strengthen children's individual skills as well as the relationship more broadly (Seehagen et al., 2025). A study conducted by Cohn et al. (1983) demonstrated the tight coupling of parent and child affect expressions in dyadic interactions by instructing mothers to interact with normal emotional expressions, and depressed emotional expressions e.g., lower tone, minimal mouth movement, decreased touch. When infants interacted with their mothers who were demonstrating depressive-like expressions, infants were emotionally disorganized, experiencing various emotions very quickly, in addition to experiencing a longer period of negative affect afterward (Cohn & Tronick, 1983). This demonstrates that the expressions parents' display during interactions can directly affect their children's emotional reactions (Morey & Gentzler, 2017). Given that parents and children participate in ongoing affective exchanges during their interactions (Verhagen et al., 2024; Zhu et al., 2025; Roth et al., 2024), a dyadic perspective may offer further insight into how these experiences play a role during learning (Fredrickson, 2001, Coffey, 2020; Kärtner et al., 2022).

Based on the Broaden-and-Build theory, periods of *shared* positive affect may be even more important than individual expressions for children's social and cognitive development.

During a parent-child interaction, the overall emotional tone affects how children engage and learn in that moment. Within a dyad, positive feedback loops quickly take hold where a parent's warmth and positive affect elicits positive affect in the child (and vice versa), which in turn motivates the parent to continue or even enhance their engagement (Somers et al., 2021). This cycle may act as a regulatory strategy that parents can capitalize on to motivate their children in otherwise challenging situations e.g., singing a song while cleaning up toys (Lunkenheimer et al., 2011). The parent's role is especially important because parents can actively and intentionally influence the affective dynamics through verbal and non-verbal elements such as their tone, facial expressions, and body posture (Weinberg et al., 1999). If parents express positive affect during an interaction with their child, there is a possibility for both individuals to experience broadened cognitive states that increase motivation and task engagement (Boyum & Parke, 1995; Rubach & Bonanati, 2021). These findings highlight the importance of understanding how affective processes unfold within dyadic interactions, in addition to within each individual.

Shared Affect

The concept of *shared affect* refers to the moments where parents and children simultaneously experience and express the same emotion (Kidby et al., 2023; Leclère et al., 2014). Shared affect leads to a harmonious and coordinated interaction where one partner's affect expression is shaped by the other partner to promote reciprocal exchanges (Lindsey, 2022; Pereira et al., 2022). Parents can use this affective connection to enrich children's problem-solving and engagement (Waters et al., 2017; Morris et al., 2017; Schirmer et al., 2020), through increased participation and sustained attention (Luo et al., 2012). To support this idea, Lunkenheimer et al. (2020) examined the associations between parent-child affective synchrony and children's social development. The researchers assessed young children and their parents

twice, when children were age 3 and then again at age 5. During the first assessment, dyads completed various problem-solving tasks that were recorded and coded for instances of dyadic synchrony. Dyadic synchrony was defined as a process in which positive emotions were reciprocated between parents and children during an interaction. To better understand how dyadic synchrony occurs, parents' emotion-related socialization behaviours (ERSBs) including discussing emotions, teaching regulation during challenging moments, and reacting appropriately to children's fluctuating affect during interactions were also measured at the first time point. Increased support and the use of more ERSBs at age 3 were associated with greater dyadic positive synchrony within dyads at age 5. In turn, increased instances of dyadic positive synchrony were associated with decreases in parent-reported child aggression at age five. These findings suggest that a synchronous affective experience may act as an indirect mechanism linking parenting behaviours to positive child outcomes. Building on this research, the current study serves to 1) extend the current literature beyond individual level experiences and 2) provide a deeper understanding of how affect is exchanged between parents and children in a problem-solving context.

Parental Goal-Orientation

One factor that may influence how parents and children express and coordinate their affect during dyadic interactions, especially in challenging contexts, is parental goal-orientation. The concept of parental goal-orientation in the context of early learning reflects whether parents emphasize the child's general learning process versus achieving a specific or "correct" outcome (Renshaw & Gardner, 1990; Francisco, 2023; Duchesne & Ratelle, 2010). Those who use a process-oriented approach focus on the natural progression of their child's development and prioritize independent exploration, an approach that is associated with a variety of supportive

parenting behaviours such as empathic instruction and autonomy support (Mageau et al., 2016). In comparison, those who use an outcome-oriented approach which is often induced by external pressures such as time constraints or a lack of social and emotional resources, tend to emphasize the child's performance or results, a style associated with more controlling behaviours such as being intrusive or demanding (Cleveland et al., 2007). A study conducted by Markoulaki et al. (2025) examined associations between supportive and non-supportive parental responses to six- to twelve-year-old children's negative affective experiences during everyday interactions. Using self-report measures, parents reports of their own non-supportive responsive strategies such as overreacting, dismissing, or simply ignoring their child's emotions within social and learning contexts were associated with more child emotional and behavioural challenges including aggression, hyperactivity, and anxiety. In contrast, parent reports of more supportive responsive strategies, such as helping their child understand their emotions, and discussing regulative strategies during difficult situations were associated with fewer child emotional and behavioural challenges. Although the findings of this study highlight the importance of parental behaviours in influencing affective dynamics, they do not assess how the context in which these interactions occur may shape how parents respond. Thus, I am particularly interested in understanding how different goal orientations may also shape how affect is expressed, elicited, and shared during parent-child interactions.

Specifically, parents who adopt a process-focused approach may be more likely to engage in supportive behaviours including expressing encouragement and warmth (Falanga et al., 2022). This approach facilitates a more positive affective environment, where children may be inclined to reciprocate positive affect leading to higher instances of shared positive affect within the dyad. In comparison, parents who adopt an outcome-oriented approach and focus on their child's

ability to finish a task quickly and accurately, may be more inclined to express frustration and other stress-related responses such as impatience or negative affect (Tang et al., 2020). In turn, this orientation may lead to higher instances of negative affect expressed both individually and within the dyad. In either context, little research has experimentally manipulated goal-orientation to examine whether process or outcome-oriented parental approaches shape how affect is exchanged and shared (Chan et al., 2009; Oshika et al., 2026).

Current Study

In the current study, I examined the influence of parental goal-orientation on affect expressions within parent-child dyads during a problem-solving task. As the Broaden-and-Build theory emphasizes the important role of positive emotions in cognitive and social development, the aim was to apply the theory in a dyadic context by focusing on the effects of parents' goal orientation on the frequency of individual expressions of affect, and instances of shared affect, between process and outcome-oriented dyads. To capture the nuances of these interactions, three dimensions of affect (positive, negative, and neutral) were continuously coded for both parents and children, to examine the affective patterns during the task. By focusing on shared positive affect and by using second by second coding, the current study can provide insight on the affective nuances within parent-child dyads during a structured problem-solving task.

Grounded in the Broaden-and-Build theory, the major objective of this study was to understand how parental goal-orientation impacts individual and shared expressions of affect. Firstly, I examined whether parental goal-orientation was associated with individual expression of affect. Based on previous literature suggesting the supportive and encouraging aspect of the process-oriented approach (Chen & Mok, 2023), as well as the controlling tendencies of the outcome-oriented approach (Hokoda & Fincham, 1995; Friedel et al., 2007), I hypothesized that

parents and children in the process-oriented condition would individually demonstrate increased positive affect and decreased negative affect relative to dyads in an outcome-oriented condition. Secondly, I examined whether parental goal-orientation was associated with the frequency of shared expressions of positive affect within dyads. If process-oriented dyads are expressing higher levels of positive affect individually, and positive affect in one partner elicits positive affect from the other, I would expect an overall increase in *shared* positive affect in this condition relative to the outcome-oriented condition.

Method

Participants

Data for this study were leveraged from a collaborative project conducted by the Social Development Lab and the Developmental Learning Lab at the University of Waterloo. The final sample for the present study included 80 parent-child dyads, with children's ages ranging from 4- to 7-years old (M = 4.43, SD = 0.50; 36 girls). Participants were recruited from both labs' existing participant databases. Non-English-speaking families were excluded from recruitment due to research activity demands. Additionally, children with developmental delays that would impede their ability to perform the tasks were excluded. As part of the larger study that is not included in the current study, parents and children wore eye-tracking glasses, and as such, families in which either the parent or child wore glasses, were also excluded. All of the study procedures were reviewed and approved by the University of Waterloo Research Ethics Board (REB #44942). Consent was received from parents prior to participating, and an assent form was read out to children during the lab visit.

Procedure

Prior to the in-lab visit, parents were asked to complete a series of questionnaires including a family demographics form, the Behavioural Inhibition Questionnaire (Bishop et al., 2003), the Self-Efficacy for Parenting Tasks Index (Coleman & Karraker., 2000), and the Parenting Scale (Arnold et al., 1993). When arriving for their 45 minute in-lab session, participants were seated at a table in a laboratory room that was equipped with two cameras and an overhead microphone. Dyads were asked to complete three age-appropriate puzzles of increasing difficulty within 8 minutes. After each puzzle was completed, a research member switched out the participants' current puzzle for the next one until all three were completed, time permitting. Parents were randomly assigned to one of two conditions: process vs outcome

orientation. In the process-oriented condition, parents were told to "focus on their child's learning experience," whereas in the outcome-oriented condition parents were told to "focus on getting the puzzles done within the given timeframe." The instructions told to both parent and child were simple and brief to avoid any confusion or inauthenticity. Of particular interest in the current study is how the task instructions for each condition affected child, parent, and dyad level expressions of affect.

Emotion Coding

Affect Coding Scheme

The code descriptions from the Sosa-Hernandez et al. (2022) coding scheme were adapted to capture the ways in which parents and young children expressed affect in the current study. The current coding scheme included four mutually exclusive codes: *positive affect, neutral affect*, *negative affect*, and *missing data*. Each code definition was comprised of facial, vocal/verbal, and body posture cues. Indicators of *positive affect* included raised cheeks, high pitch, and playful behaviour. Indicators of *neutral affect* included a relaxed facial expression (no sign of smile or frown), calm tone, and normal engagement in task. Indicators of *negative affect* included furrowed brows, angry and sad speech, and a lowered head position. Lastly, *missing data* was coded if the child or parent had left the room or no information could be extracted during the video (e.g., missing audio or face, body off camera). The full coding scheme is presented in Appendix A.

The coding team was comprised of three members: a graduate student, an undergraduate student, and a research assistant. The graduate student was considered the master coder and the other two coders coded either child affect or parent affect for each dyad. Using MANGOLD Interact software, videos were coded second by second, with each second of each 8-minute puzzle providing a unique data point. Prior to independent coding, 15 pilot videos were used for

coder training. Videos were assigned to familiarize coders with the coding scheme, in which videos with no possible opportunities for positive, negative, and neutral coding due to restricted visibility of participants (e.g., missing sound, and face) were omitted. The training period lasted multiple weeks including independent learning, and group discussions reiterating coding scheme specifics. After all practice videos were reviewed, the team began independent coding.

Inter-Rater Reliability

Inter-rater reliability was assessed using 18 randomly chosen videos coded by each pair of coders. Cohen's kappa and percent agreement were calculated. After each assigned video was coded and reliability was conducted, virtual collaborative meetings were held to discuss the coding and reliability measures. Coding pairs discussed and resolved all discrepancies so a single coding file could be used for analysis. Coders demonstrated adequate inter-rater reliability with an average percent agreement of 91% for parent affect, $\kappa = .51$, and an average percent agreement of 89% for child affect, $\kappa = .59$. The high percent agreement accompanied by low kappa values likely reflect the disproportionate number of neutral codes, which were coded approximately 80% of the time, relative to both positive and negative codes, in both parents and children.

Data Cleaning and Reduction

Data from eighty parent-child dyads were separately coded by independent coders. All inconsistencies in codes were resolved prior to data cleaning. Once coding was completed, parent and child affect codes were reviewed to ensure that each second of the 8-minute video had a code assigned to it. Complete parent data files were then merged with complete child files to create a single data file per dyad.

Data Analysis Plan

Affect codes were grouped across the whole duration of the puzzle task and converted into time-based proportions in order to have standardized dyadic data. A mixed-design ANOVA was conducted in R to examine whether role (parent vs. child) or goal-orientation condition (process vs. outcome) were associated with the proportion of time individuals expressed each affect type. The use of proportions was more appropriate than raw frequencies as dyads varied in the total times spent working on each puzzle (e.g., differences in pauses, transition time between puzzles).

To quantify the amount of *shared positive affect*, we used state-space grid modelling within MANGOLD Interact. State-space grids were created for each dyad to visualize patterns of dyadic positive affect expression. Using the affect codes, two-dimensional grids were created reflecting parent affect on the x-axis, and child affect on the y-axis. These grids were comprised of nine cells that demonstrated the co-occurrence of each combination of parent and child affect (e.g., child is positive while parent is neutral). These grids also included information such as time in each shared state, and transitions reflecting changes in affect during the task. The total time in which dyads displayed positive affect concurrently was then divided by the total duration of the task in seconds. This metric indexed the proportion of time parents and children spent *simultaneously* expressing positive affect. To note, state-space grids provide all 9 dyadic combinations, however only shared positive affect was used in the statistical analysis. As such, the primary dependent variable for the second hypothesis was the total proportion of time dyads were engaged in shared positive affect. To examine whether the proportion of time both parents and children express positive affect differed between the conditions across the interaction, an independent samples t-test was conducted in R with visualizations. To supplement the statistical

analysis, a heat map was produced using R, to visualize the distribution of parent-child affect combinations across the full sample. This included the proportion of time dyads were in all nine affective combinations. Colour intensity within the heatmap represented higher proportions of time in the corresponding co-occurring affective state, providing visual depictions of where dyads were most likely to match or mismatch in their affective expression. The purpose of this heatmap was to provide a descriptive visualization to complement the quantitative analyses conducted.

Results

Overview

Analyses were conducted to examine whether parental goal orientation (process or outcome-focused) influenced (a) the proportion of time each individual member of the dyad expressed each affect state and (b) the proportion of time dyads spent in a shared state of positive affect during the puzzle task. Descriptive statistics were examined for all DVs, and the distribution of each variable was examined (i.e., skew, kurtosis). Prior to examining the ANOVA results, assumptions regarding normality and homogeneity of variance were tested. Negative affect and positive affect codes demonstrated normality deviations; however this was expected given the nature of proportional data with highly skewed rates of occurrence of each code (i.e., neutral was the predominant expression coded). A Levene's test of homogeneity revealed no significant differences across the two conditions, $F(1, 478) = 0.02$, $p = .90$, and therefore considering the robust nature of an ANOVA and moderate deviations, we proceeded using the original proportions for all variables. The effects of role (parent vs. child) and goal orientation (process vs. outcome) on individuals' affect expressions (positive, negative, and neutral) were examined using a 2 x 2 x 3 mixed ANOVA.

Hypothesis 1: Influence of Goal-Orientation on Individual Expressions of Affect

We hypothesized that parents and their children in the process-oriented condition would individually demonstrate increased positive affect and decreased negative affect relative to dyads in the outcome-oriented condition. There was a significant main effect of affect, $F(2, 156) = 8363.31$, $p < .001$, demonstrating that both parents and children displayed predominantly neutral affect, followed by positive affect, and then negative affect when completing the puzzle task. However, contrary to my first hypothesis, there was no significant Condition x Affect interaction,

*F(*2, 156) = 1.07, *p* = .347, suggesting that the predicted increase in positive affect and decrease in negative affect in the process-oriented condition was not observed.

However, these results were qualified by a significant three-way interaction between Condition, Role, and Affect, *F(*2, 156) = 4.50, *p* = .013, suggesting a difference in how parents and children distributed their affect expressions based on the goal-orientation condition they were in. To examine the three-way interaction further, separate 2 (Role) x 3 (Affect) follow-up analyses were conducted within each condition. The Role x Affect interaction was significant only in the outcome-focused condition, *F(*2, 468) = 5.89, *p* = .003. Pairwise comparisons revealed that in the outcome-oriented condition, parents (*M* = 10.33%) expressed significantly more positive affect than their children did (*M* = 7.04%), *p* = .006 (see Figure 1).The corresponding comparison in the process-oriented condition was not significant (*p* > .05), demonstrating that parents and children did not differ in the proportion of positive affect expressed.

To further understand how affect differed across conditions, separate 2 (Role) x 2 (Condition) follow-up analyses were conducted for each affect type. For positive affect expression, a significant Role x Condition interaction emerged, *F(*1, 468) = 5.95, *p* = .015. Pairwise comparisons were consistent with the earlier finding that parents expressed significantly more positive affect than children, solely in the outcome-oriented condition (*p* = .006). Similar follow-up testing for neutral affect expression also revealed a significant Role x Condition interaction, *F(*1, 468) = 6.48, *p* = .011. However, pairwise comparisons indicated no significant parent-child differences for either conditions. There was no significant Role x Condition interaction for negative affect expression, *F(*1, 468) = 0.01, *p* = .907, suggesting that regardless

of condition, parents and children spent similar and low (e.g., < 3%) proportions of time expressing negative affect.

Hypothesis 2: Influence of Goal-Orientation on Shared Expressions of Positive Affect

Subsequently, an independent samples t-test was conducted to examine the proportion of time dyads spent in states of shared positive affect during the cooperative puzzle task between both the process-oriented and outcome-oriented conditions. The t-test demonstrated a non-significant difference in the proportion of shared affect between dyads in the process (M = 1.95%) and outcome condition (M = 1.57%), $t(78) = 0.96$, $p = .341$, $d = 0.21$. These findings suggest that parents' goal-orientation did not significantly influence the proportion of time parents and children spent in a state of shared positive affect.

Mean proportions of dyadic shared positive affect across both goal conditions is visually represented in Figure 2. While the analysis examined the influence of goal-orientation on shared positive affect specifically, other shared states were descriptively examined to understand dyadic shared affect more generally across both conditions.

Patterns of Dyadic Shared Emotional Expressions

Mirroring individual affective patterns, both process (73.9%) and outcome-oriented (72.3%) dyads predominantly displayed shared neutral affect. The proportion of time dyads spent in all nine affective combinations across the interaction is presented in Figure 3. Overall, process-oriented dyads demonstrated a greater proportion of matched affective states (i.e., aligned on the diagonal; 75.6%) compared to outcome-oriented dyads (73.8%). In comparison, outcome-oriented dyads demonstrated a greater proportion of mismatched affective states (26.2%) compared to process-oriented dyads (24.4%), suggesting the possibility of reduced alignment in this specific goal condition.

Discussion

The goal of the current study was to examine whether instructing parents to focus on different goals influenced parent and child affect during a problem-solving task. Contrary to our hypotheses, there was no significant effect of the experimentally manipulated goal-orientation on individual affect expression or shared positive affect. However, parents displayed significantly more positive affect than their children, but only in the outcome-oriented condition. Overall, the original hypotheses were not supported.

Overexpression of Neutral Affect

Across the conditions, both parents and children consistently displayed high levels of neutral affect. This finding was surprising, as we expected dyads in the process-oriented condition to display more positive affect given the known relation between process-orientation and supportive and encouraging parenting behaviours. This suggests that parental goal-orientations, on their own, do not influence parents' own, or their children's, expressions of affect during a structured task. The dominance of neutral affect within dyads aligns with other research suggesting more cognitively demanding tasks typically involve less pronounced displays of emotion (Van Dillen et al., 2009; Sebastian et al., 2017). In this study, as parents and children entered the laboratory, they were instructed to complete a series of puzzles. The outcome of the task is clear and follows a streamlined process that keeps the dyads focused on the end-goal. Therefore, the structure of this task may limit the potential for variability in affect expressions.

The overexpression of neutral affect presented several unanticipated challenges: 1) it was challenging to achieve a high level of inter-rater reliability across all the affect codes, 2) it limited variability in other codes which limits ability to detect meaningful sources of variability,

and 3) it limited our ability to understand complex affective exchanges between parents and children. This raises the question of what exactly are children and parents experiencing when they express neutral affect. Previous research has highlighted some challenges with behaviourally coding observational data including how to distinguish between types of affect (e.g., neutral versus low positive affect) (McManus et al., 2024). In the current study, specifically when working with a new coding scheme and novice coders, the subtle differences between neutral affect and low levels of positive affect (or contentment) may have been missed. The inconsistencies observed in the inter-rater reliability calculations could be explained by these difficulties where anything other than clear, strong expressions of positive affect were 'clumped' into the neutral code. This highlights the importance of thorough coder training, and extensive conversations about the coding scheme, when using continuous affect coding in future research.

Differences in Parent and Child Individual Affect Expression

One notable difference in rates of expressed affect was that parents expressed significantly more positive affect than their children, but only in the outcome-focused condition. This finding was surprising as it was the opposite of what we hypothesized and inconsistent with literature demonstrating that intense performance-focused tasks can decrease individuals' supportive and encouraging behaviours (Weaver et al., 2004; Kiuru et al., 2014).

One possible interpretation for this discrepancy is that as children are completing the task, they may have perceived greater expectations from parents under the pressure of the outcome-oriented condition, shaping the affective dynamics of the interaction. In turn, parents might try to self-regulate their own sense of pressure and increase their own positive affect as a regulatory response. Parents who use their own positive affect to increase their child's positive affect may be engaging in a strategy that can potentially increase their child's engagement and

build resilience during complex tasks (Hudon-ven der Buhs & Gosselin, 2017). This explanation is consistent with the emotion co-regulation literature in which parents purposefully regulate their own expressions to support their children's emotional well-being (Hajal & Paley, 2020; Thompson & Meyer, 2015; Haskett et al., 2012; Zhang et al., 2022; Roth & Assor, 2012).

An alternate interpretation for this discrepancy relates to the nature of the task and environment. Since dyads were being observed in the laboratory, parents may have felt pressure to guide and respond to their children in a socially acceptable manner, particularly during challenging moments that may have occurred more frequently in the outcome-oriented condition due to the emphasis on performance and completion. Parents may have increased their positive expression to regulate their perceptions of their child's frustration within this condition, but also to be perceived as an empathetic parent. The effects of social desirability biases on participants' behaviors are particularly strong in observational research studies (Gardner, 2000).

Although these interpretations are plausible, it is important to note that actual parenting behaviors and strategies (e.g., emotion regulation, frustration regulation) were not directly assessed. Without measures of parenting goals and behaviors, we are unable to isolate the mechanisms underlying the discrepancy in rates of positive affect between parents and children in the outcome-oriented condition. As such, future work should examine parents' goals and behaviors in outcome-oriented conditions to better contextualize the increase in positive affect.

The Importance of Timing: Shared Affect

In the current study, shared affect within dyads was examined using state-space grid modelling helping us visualize how often do individuals experience different affective states, and for how long they express different types of affect (Hollenstein, 2012; Grumi et al., 2022; Hollenstein & Lewis, 2006; Provenzi et al., 2015). Aligned with the patterns of individual

expressions of affect, parents and children spent the vast majority of their time in a state of shared neutral affect. In contrast to what we expected, there were minimal occurrences of shared positive and negative affect within dyads and across conditions. When parents and children displayed emotions other than neutral, they were usually expressed asynchronously rather than shared. For instance, expressions of positive affect by both parent and child were brief lasting only a few seconds, with dyads spending an average of two percent of the task in a state of shared positive affect. Thus, the likelihood of having both parents and children express positive affect in unison is low (Figure 2). This might suggest that the shared aspect of these affective exchanges might not be as prominent, salient, or influential as other aspects of affective experiences, such as the temporal coordination of expressions between dyad members (Hubbard et al., 2023).

Specifically, it may be beneficial to move beyond simply examining the amount of shared affect to thinking about the dynamics of parent-child affective exchanges across the course of an interaction. Research grounded in dynamic systems theory would conceptualize emotion coordination as a reciprocal process with the flow of the interaction meaning more than the average amount of emotion expressed (Fogel et al., 1992; Thomassin & Suveg, 2014). This view of parent-child interactions being dynamic, flexible, and contextually embedded is in line with current work on parent and child co-regulation (Lunkenheimer et al., 2011; Paley & Hajal, 2022; Myruski, & Dennis-Tiwary, 2021). Assessing these affective states concurrently and averaging over the course of an interaction might overlook which individual and contextual factors drive the affective shifts (Lobo & Lunkenheimer, 2020). Additionally, shared affect states might not adequately capture real-world experiences. That is, real-world affective exchanges between parents and children might not be characterized by simultaneous expressions, and coordination

may not be immediate e.g., something positive a parent says might not be picked up by the child for a few seconds (Tronick, 1989; Feldman, 2007). This delayed aspect of the interaction may play a role in positive affect expression and may be better captured using a temporal approach.

Another possibility is that periods of shared positive affect are meaningful and important but that the task demands in the current study created a floor effect, or suppressed, the frequency of positive affect for both parents and children. Having dyads complete goal driven tasks (vs. open-ended conversation or discussions of emotionally salient topics), including the puzzle task in the current study, may favour completion over communication and affective exchanges (Lu et al., 2017; Saarimäki, 2021). Therefore, future work should examine both the frequency of shared affect and the temporal dynamics of affect during interactions in a variety of contexts to investigate whether more instances of shared positive affect emerge in different contexts.

Contributions to the Broaden & Build Theory

The current study acts as an initial step in extending the Broaden & Build theory (Fredrickson, 2001) that emphasizes the importance of experiencing positive emotions during intellectually stimulating tasks. This theory is frequently used to understand individuals' expressions of positive emotions, however understanding how one person's affect can influence another person's affect has the potential to advance this theory further.

The infrequency with which positive affect was expressed and shared may suggest that structured and intentional tasks constrain the affective expressiveness of individuals. In turn, the goal-directed nature of the task within our study, may have narrowed rather than broadened, attentional scope and flexibility, however this was not directly measured. Although instances of positive affect were seldom, these findings raise the possibility that the current measure of shared affect is not reflective of the dynamic nature of these affective exchanges. The current study can

inspire future research to examine various dyadic activities (e.g., joint play), that elicit more affective expressiveness which may further extend these important theoretical models, to account for dyadic factors.

Future Directions

As noted above, future work should explore the timing of parent-child affective exchanges to better understand dyadic affect expression as it unfolds over the course of an interaction. Additionally, measures of parental motivation and behavioral strategies to understand the underlying mechanisms that drive increased parental positive affect during problem-solving tasks, specifically for parents who are more inclined to adopt an outcome-oriented approach, should be incorporated. It will also be interesting to examine affect expression and dyadic coordination across a variety of contexts and particularly in more naturalistic environments without an explicit emphasis on goals. The next step in this line of research should focus its efforts in extending theoretical frameworks such as the Broaden & Build theory, to further understand dyadic interactions. Lastly, future work should examine how the dyadic patterns during these interactions influence children's behaviour and affect in subsequent and independent problem-solving contexts. This would be beneficial for understanding how children internalize the socialization messages conveyed through dyadic affective exchanges.

Conclusion

In the current study, I examined how parental goal orientation influenced individual and shared positive affect expression within parent-child dyads during a problem-solving task. Although the findings did not provide support for my hypotheses, the study provided rich descriptive data that will inform future research. Contrary to our hypotheses, individual levels of affect expression did not significantly differ across conditions. Both parents and children spent

the vast majority of the task expressing neutral affect, with minimal instances of positive and negative affect. However, parents in the outcome-oriented condition expressed significantly more positive affect than their children. This suggests that goal-orientation may influence the affective expression that is demonstrated and exchanged between parents and children. At the level of the dyad, parental goal-orientation was unrelated to the frequency of instances of shared positive affect. Considering that the periods of individual positive affect and shared positive affect were very brief, a temporal approach could be beneficial in elucidating the dynamics of parent-child affective exchanges as they unfold over the course of an interaction. The findings from this study imply that theoretical models such as the Broaden & Build theory could be enhanced by considering positive affect in dyadic contexts.

Overall, previous work highlights the importance of acknowledging dyadic affective dynamics as complex processes driven by multiple mechanisms including factors such as parental goal-orientation, time, environment, and dyadic partner. These factors are not isolated but rather interconnected and effect one another. The current study reflects an important step in examining these factors concurrently. Additionally, the regulation strategies parents use can help children apply what they learn during these interactions across other contexts throughout their development. In general, this work demonstrates the intricacy of parent-child affective exchanges and invites future research to capture the nuances that can shape parent-child relationships, and children's social and cognitive growth during learning.

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Appendices

Appendix A

Modified Affect Coding Scheme for Individuals and Dyads

Positive Affect Behavioral Indicators

Facial cues	Vocal/ Verbal cues	Body posture cues
Raised cheeks	Warm and high/Excited pitch	Leaning in towards partner
Genuine smiling	Making jokes (shared)	Open body posture
(lips apart or together turned up)	Warm and questioning tone	Head nodding
	Validating	
Happy eyes		**Examples**:
Shared laughter	**Examples:**	Playful behavior (e.g., making faces in the mirror)
Maintaining eye contact	Laughing/giggling	
	Parent is engaging/motivating the child (driving child to keep doing the task)	Clapping
Examples:		
Making playful faces	Validating/positive affirmation ("There you go, Good Job", "Nice", "Perfect"; "Where would you start?")	
	Terms of endearment ("dear")	

Neutral Affect Indicators

Facial cues	Vocal tone cues
Familiarize yourself with participant's resting facial features	Relaxed and calm tone
	No variability in pitch and volume (even pitch)
Should look relaxed not displaying positive or negative affect	**Examples:** Normally engaging in task, asking questions, no major differences in affect

Negative Affect Behavioral Indicators

Facial cues	Vocal/ Verbal cues	Body posture cues
Brow lower/Raise up/Scrunch up	Low/Or aggressive volume	Avoiding eye contact
	Slowness or quaver of speech	Fidgeting /Restlessness
Cheek/Lip biting	Nervous laugh (not shared)	Head down
Eyes wide open	Slow sighing or fast/Irregular exhalations/ Breathing	Tense/Slouching posture
Poor eye contact		Hand over mouth
Clenched jaw/Teeth	Invalidation/Patronizing (e.g., saying something rude)	Head or body aversion
Wrinkling nose		
Eye rolls		**Examples:**
Uncomfortable/Smirk smile	**Examples:**	Leaning back ("I don't know")
Pushing child's hand away	"This is hard"	
	Strict/controlling speech ("No, I'll give it to you")	
	"Good enough" (in a negative tone)	
	Rushing ("quick, quick, quick"/ "we need to get this done")	

Missing Affect

- Cannot see the child or parent's face (they move out of frame)
- E.g., Parent or child has left the room and there are no other indicators of affect i.e., absent voice, body language, and facial cues

Appendix B

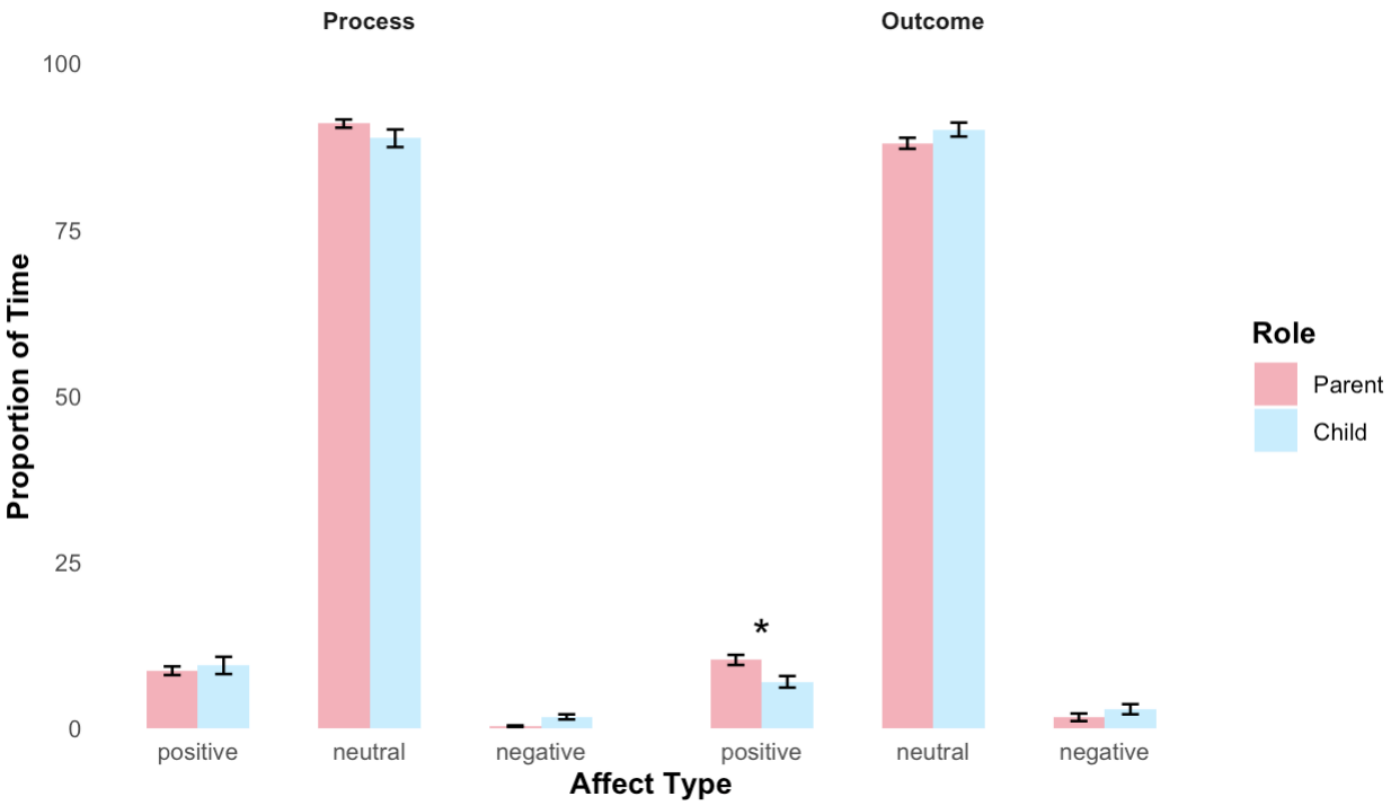


Figure 1. Parent and child affect by goal-orientation condition

Mean proportion of time parents and children expressed each affect type during the puzzle task, by goal-orientation. Error bars represent ± 1 standard error of the mean. * indicates a significant difference in parent and child positive affect expression in the outcome condition.

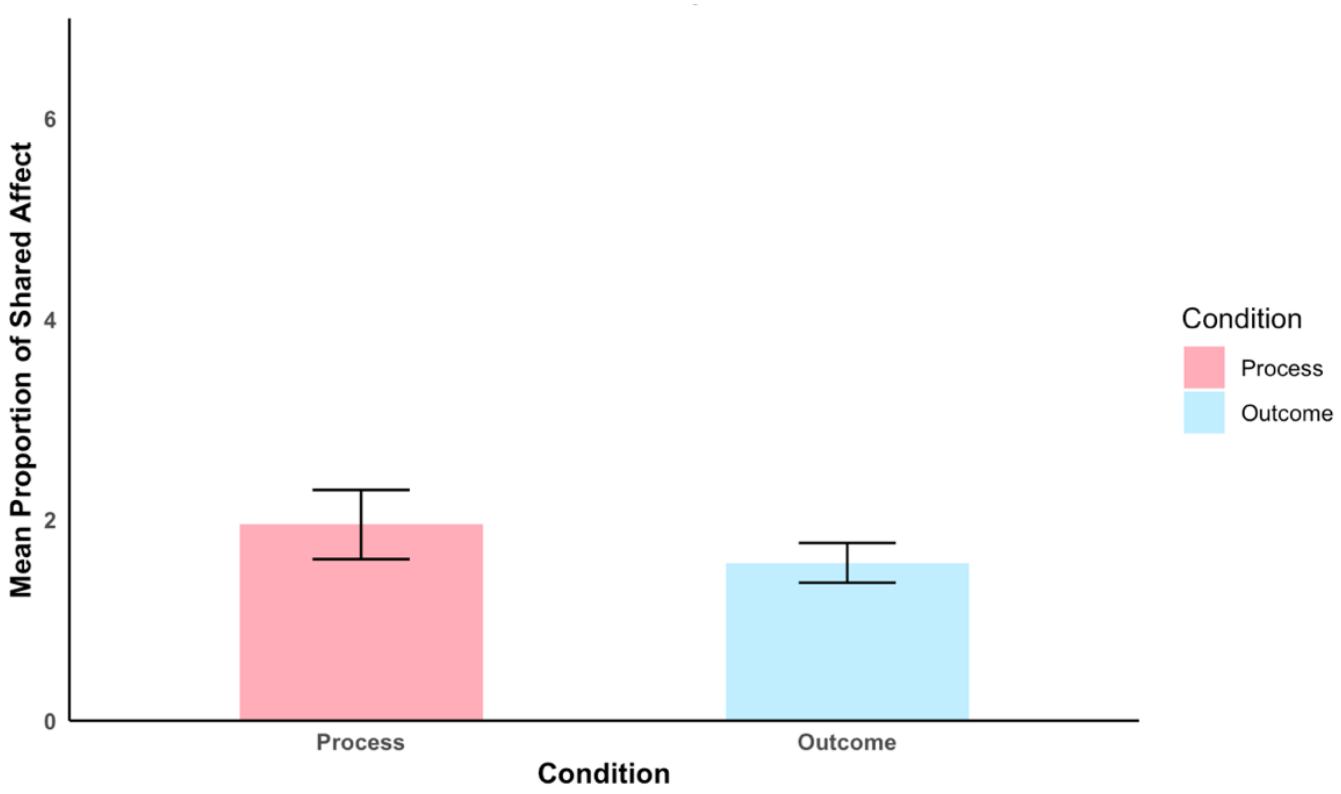


Figure 2. Mean proportion of shared positive affect by goal-orientation

Mean proportion of time dyads shared positive affect during the puzzle task, by goal-orientation.

Error bars represent ± 1 standard error of the mean.

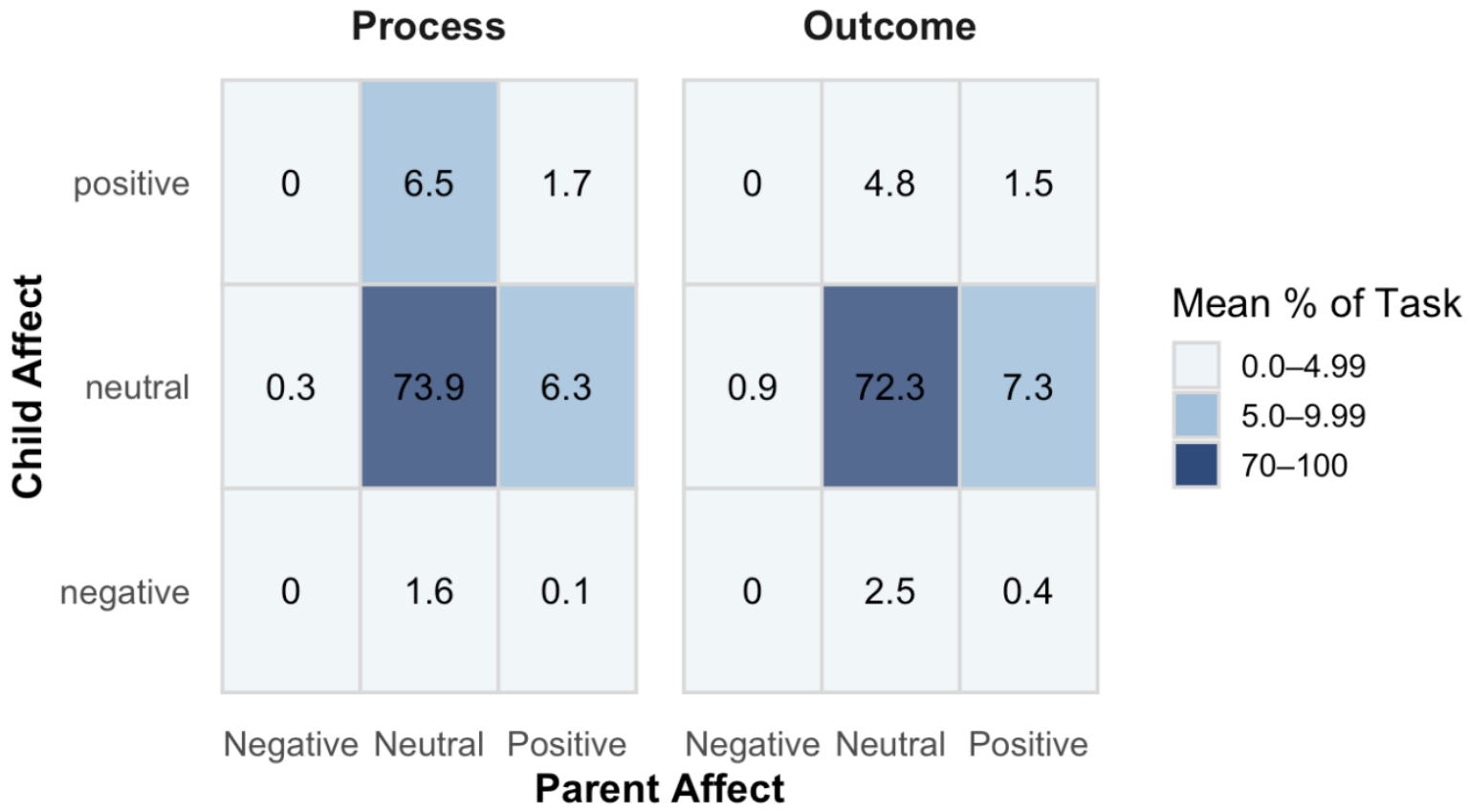


Figure 3. Parent-child shared affect by condition

Heatmap visualizations represent the mean proportion of time parent-child dyads spent in each affective state combination during the puzzle task, across both process- and outcome-oriented conditions. Parent affect is displayed on the x-axis, and child affect is displayed on the y-axis. Darker shades reflect a greater proportion of time spent in the corresponding affective state. Legend ranges were based on the observed data collected.