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The Development of Temporal Localization Skills in Maltreated Children

THESIS

submitted in partial satisfaction of the requirements
for the degree of

MASTER OF ARTS

in Social Ecology

by

Stephanie Anne Denzel

Thesis Committee:
Professor Jodi Quas, Chair
Professor Beth Cauffman
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2014

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ABSTRACT OF THE THESIS

The Development of Temporal Localization Skills in Maltreated Children

By

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Master of Arts in Social Ecology

University of California, Irvine, 2014

Professor Jodi Quas, Chair

The purpose of the present study was to examine the development of temporal localization abilities about salient past events in maltreated children, the population of children most likely to be asked temporal questions in a forensic or legal setting. Of particular interest was how well the children could respond to questions in which the terms near, before and after were used in related to the present and past, verifiable and salient events. Participants included 167 maltreated children (85 female) ages 6 to 10 years waiting for court appearances in the Los Angeles County Dependency Court. Overall, children seem to have an understanding of the temporal terms near, before and after. However, their understanding is not necessarily what would be expected from past studies. Specifically, children's temporal understanding appears to depend on both the timing and type of event in question itself as well as the cyclical nature of landmark events to which the event is being compared. Children struggled with answering questions about one of two past events and older children displayed a prospective bias in their answers. Results suggest that temporal localization questions may not be useful in forensic or legal settings where precision is required.

Introduction

Localization refers to children's general ability to judge and discuss when events in time occur relative to the present or to a past landmark event. Children suspected of maltreatment are routinely asked localization questions in legal settings. They may be asked, for example, whether alleged abuse occurred before or after another event, such as their birthday, in an effort to narrow down the timeframe or determine what charges to pursue. Children's responses have the potential to affect the believability of their reports, the charges, the progression of the case, and ultimately, the outcome. Yet, very little is known about the developmental of children's localization abilities, both in general and in relation to salient prior experiences. Such knowledge, however, could inform developmental models of children's broader temporal understanding and lay the foundation for what should be expected from children in legal settings.

The purpose of the present study was to examine the development of temporal localization abilities about salient past events in an ecologically significant population – maltreated children. Of particular interest was how well children could respond to questions in which the terms near, before and after, were used in relation to the present and the past.

Skills Underlying Children's Temporal Abilities

A useful starting point to understanding children's localization abilities is to consider the cognitive and social skills that contribute to those abilities. Temporal localization requires an individual identify when an event occurred in reference to either the present or to another past event. In other words, knowledge of how long or short ago, how near or far in time, and in what order events occurred is needed to localize events. Localization, though, relies not only on basic episodic memory abilities, but also on understanding temporal language and on a somewhat sophisticated level of executive processes (Friedman & Lyon, 2005; Nelson & Fivush, 2004;

Ornstein, Haden & Hedrick, 2004; Zelazo et al., 2003). Children must comprehend and be able to use temporal concepts when discussing events, maintain information about the event in question, and recall details about comparison language, reference events, and temporal scales. Finally, children must concurrently possess a certain level of socialization, especially with language, to understand the mechanics and use of socially agreed upon terms in conversations, including localization terms.

All of these skills develop gradually throughout the preschool and early school years (Nelson & Fivush, 2004; Ornstein, Haden & Hedrick, 2004; Zelazo et al., 2003; Fivush, Haden, & Adam, 1995; Bauer & Mandler, 1985), suggesting that temporal localization skills would develop along a similar time line. However, integrating skills and using them in concert are often more difficult than utilizing skills in isolation. Thus, temporal localization abilities may develop substantially later than the cognitive and social skills that support such abilities, and localization may be quite difficult even through middle childhood, a trend supported by research on children's temporal memory that indicates children have difficulty accurately recounting some facets of temporal details, even into early adolescence (Friedman & Lyon, 2005).

Temporal Localization: Distance and Sequencing

Events can be located in time through a variety of means, most notably by describing an event's location relative to the present or to a past event, the proximity of two events (e.g., how near in time two events are), the distance of past events from the present (e.g., did one even occur a long or short time ago), or the sequence of two events. Although research has yet to investigate children's understanding of temporal proximity per se, a few studies have examined distance judgments and sequencing in children. Studies have specifically focused on children's ability to discern how long ago specific events happened (distance), at times in relation to each

other or the present, and on the order (sequence) of multiple past events (Friedman, 1991; Friedman & Kemp, 1998).

When children have been asked distance questions, for instance, to choose which of two events occurred a shorter or longer time ago, children as young as age 4 can often correctly judge distance. This is most often the case when the events are staged, when the events are separated by a substantial period of time, or when one event was fairly close to the present (Friedman, 1991; Friedman & Kemp, 1998). By age 5, children can correctly judge the relative recency of their birthday and major holidays, but again primarily when these events occurred within the past few months (Friedman & Kemp, 1998).

To extrapolate from these findings to understand how children likely make proximity judgments, extant results suggest that, when events are either relatively recent or separated by more than a few months, even young children have a basic understanding of temporal distance and hence can render somewhat accurate temporal judgments about nearness. However, answering a question about whether an event is near another requires a dichotomous judgment, which, without a clear referent point, can be ambiguous and hence difficult for children to answer, or at least answer in a consistent manner. In addition, the developmental time course of localization, including for arousing or personally significant events, that is, the types of events about which maltreated children may be asked, remains unclear (Goodman, Quas, Batterman-Faunce, Riddlesberger, & Kuhn, 1994).

A related localization skill is that of sequencing or ordering events. Unlike distance judgments, sequencing simply requires that children put events in order, at times without reference to the present. On the one hand, sequencing may seem easier than judging distance because the former is less cognitively taxing (e.g., sequencing involves considering events in

isolation whereas distance judgments requires the added aspect of maintaining perspective from the present). On the other hand, however, empirical research suggests that sequencing may actually be more difficult and develops slightly later either because of the need to recall not one but two concurrent events while making temporal comparisons between them or because children are attempting to compare both of the events to each other and to the present. Pathman, Larkina, Burch, & Bauer (2013), for instance, found that 6 and 8 year olds, but not 4 year olds, could place two personal experiences that occurred within the last 4 months in the correct order, and Friedman (1992) found an even later age of sequencing onset among children asked to order holidays and their birthday: It wasn't until the third grade, that is, age 8-9 years, that children's performance exceeded chance. Finally, Friedman and Lyon (2005) found that, although first graders could order two staged events that occurred fairly recently, even children as old as 13 struggled when asked whether one of the events occurred before or after an unrelated landmark event (Halloween). Further, when asked what else occurred around the time of the event, few children mentioned Halloween.

Thus, sequencing judgments likely reflect a later developing skill than distance judgments. Moreover, and of relevance to the present study, children do not seem to use what are often called landmark events, that is commonly experienced or socially significant events, as reference points when answering temporal localization questions, even when explicitly directed to these events. Of course, research to date has largely concerned non-arousing, staged events. Similar patterns may or may not hold when children are asked about events that are especially salient or personally meaningful. Perhaps children would be better able to use landmark events to localize if asked to make temporal judgments about arousing and significant prior experiences,

similar to how aspects of emotional events are often better remembered than aspects of less emotional events (Heuer & Reisberg, 1992).

Temporal Localization: Cyclical Events

Across most prior studies, the types of events most often used as landmarks have been either holidays or birthdays (Friedman, 1992; Friedman & Kemp, 1998; Friedman & Lyon, 2005). Although these events reoccur annually, their cyclical nature has been virtually ignored in localization research, despite its potential to affect children's proximity judgments, especially for events in the distant past.

At a basic level, children become aware fairly early in development of some aspects of the cyclical nature of temporal information. For instance, children can recite time scales (e.g. months of the year) accurately as young as 6 years of age (Friedman, 1991). Shortly thereafter, they can recognize and order common recurring landmark events within the calendar year (Friedman, 1977). Finally, when asked their birthday, children typically describe the date in present tense using only the month and the year (Wandrey, Lyon, Quas, & Friedman, 2012), which further suggests that they have some understanding of its recurring nature, although for some children, these responses may reflect a failure to memorize their birthday.

Possessing basic knowledge about events' cyclical nature, however, does not mean that children can actually use cyclical scales to localize events. Instead, attempting to use cyclical scales to answer localization questions may actually undermine children's accuracy. For instance, Friedman (1977) found that, until age 8, children were unable to recognize correct permutations of the order of common scales (e.g. listing the months of the year from June through May rather than January through December), and until age 10, children were unable to recognize explicitly that the scales were continuous. Specifically, children were given 13 cards

with the months of the year (all 12 months plus a duplicate January) and asked to put the cards in the correct order. The 10-year-olds, but not younger children, correctly ordered the months from January to January. The younger children, in contrast, either ignored the duplicate January card or placed it on top of the first card.

In other investigations, children were asked to use recurring events as reference points on localization tasks. Limitations were similarly evident. When children's birthday was going to reoccur in the next few months, those under age 9 tended to incorrectly report that their birthday occurred more recently than other holidays. In actuality, the children's birthday had occurred a longer distance in the past (Friedman, Gardner, & Zubin, 1995). Of interest, this same pattern emerged in 5-7 year olds responses to questions about the relative recency of a school event and their birthday (Friedman & Kemp, 1998). Those with *upcoming* birthdays incorrectly stated that their birthday had occurred more recently than the school events, whereas those with birthdays that were in the more distant future did not make this error as frequently. Friedman & Kemp (1998) speculated that the proximity of children's next birthday interfered with their recency judgments. He argued that children have an automatic tendency to shift their attention toward the future, even when directed explicitly to a past event. This, in turn, could lead to what we call a prospective bias when children are asked about landmarks in relation to the present. A prospective bias would lead children to orient towards the upcoming occurrence of a reoccurring landmark event when judging temporal location, even when a past occurrence of the landmark event is closer in time. Of importance, such a bias may be especially salient when children are not directed to consider the past, as there is evidence that even children as old as 9 years find mentally moving forward in time easier than mentally moving backwards (Fivush & Mandler, 1985; Friedman, 2000).

Summary and Remaining Questions

Overall, research suggests that, at the same time children as young as 6 years of age can answer relative distance or sequencing questions about staged events, even older children have difficulty localizing events in relation to landmarks. Similar, if not more pronounced, difficulties are likely to emerge when children are asked proximity questions. Moreover, when temporal localization questions explicitly reference or ask about a cyclical event, children may have particular difficulty and may display a type of prospective bias. Thus, shortly after a cyclical event (e.g., a birthday) occurs, children may begin to use the next occurrence of that event when judging the relative location of a second event.

What remains unclear, though, are three important questions: 1. How well can children answer temporal proximity questions, both about the present and landmark past events? 2. Do children show evidence of localization abilities at even fairly young ages when they are asked to localize events that were personal and salient events? And 3. How does the cyclical nature of landmarks further contribute to localization? These questions were addressed in the present study. Specifically, the study investigated how well maltreated children answer proximity and sequencing questions about both the present and a significant past event relative to an unrelated landmark.

The development of temporal localization skills in maltreated children may differ slightly from non-maltreated children. Maltreated children generally exhibit cognitive and developmental delays (Veltman & Browne, 2001), suggesting that their temporal abilities are also likely delayed. Second, temporal linguistic knowledge develops, in part, through interactions with parents (Fivush & Nelson, 2006) and maltreated children may have fewer of these interactions with their parents, which could reduce maltreated children's ability to describe

the temporal location of events in a clear or accurate manner. However, maltreated children are a critically important population to examine, as these are the children most likely to be asked these questions in a forensic or legal setting and thus their performance has direct implications for understanding how children may respond such settings.

Based on prior research, several hypotheses were advanced. Overall, improvements in children's temporal localization abilities with age were anticipated, though it was further expected that these improvements would depend on the skill (proximity or sequencing) and reference point (present or landmark event). Specifically, it was predicted that, although even the youngest children would be able to judge proximity of events in relation to the present, across age, children would have more difficulty judging proximity in relation to a landmark event, but the latter skill would improve with age. These predictions are based on evidence that children's temporal skills involving other subjective judgments like relative recency improve with age (Friedman, 1991; Friedman & Kemp 1998), but that even older children struggle with questions involving unrelated landmark events (Friedman & Lyon, 2005). It was also hypothesized that children's ability to sequence two events would emerge later with development, and primarily when there was a far distance between the target and landmark event, consistent with prior research into children's sequencing of generic or staged events (Friedman, 1992; Friedman & Lyon, 2005; Pathman et al., 2013). Finally, a prospective bias was anticipated, such that children would incorrectly judge a past event as being more recent or near a landmark if the landmark will reoccur in the near future. This latter hypothesis, though tentative, stems from the research suggesting that children struggle with relative temporal judgments involving cyclical events occurring near each other (Friedman et al., 1995; Friedman & Kemp, 1998).

Methods

Participants

Participants included 167 maltreated children (85 female) ages 6 to 10 years waiting for court appearances in the Los Angeles County Dependency court. The age breakdowns were as follows: 31 6-year-olds ($M = 6-6$), 33 7-year-olds ($M = 7-5$), 36 8-year-olds ($M = 8-7$), 34 9-year-olds ($M = 9-5$), and 33 10-year-olds ($M = 10-5$). All children had been removed from the custody of their parents or guardians due to substantiated maltreatment. Children who were unable to communicate clearly in English or who were awaiting a hearing in which they might testify were excluded. The ethnic/racial background of the sample was diverse and consistent with the dependency court population in the county where data were collected (Needell, 2014): 53% Hispanic/Latino, 30% African-American, 13% non-Hispanic Caucasian, 1% Asian and 3% other or unknown.

Materials and Procedures

All study materials and procedures were approved by the Presiding Judge of the Los Angeles County Dependency Court, agencies that work with maltreated children, and relevant Institutional Review Boards. Consent was provided by the judge.

A trained female graduate or undergraduate researcher reviewed a calendar of court appearances on interview days and identified children scheduled to appear in court that day. In Los Angeles County, children routinely attend dependency court hearings when they are age 4 years or older. While awaiting their hearing, they remain in a designated, supervised childcare facility. Children who met the eligibility requirements were approached in the childcare facility and invited to take part. Those who agreed were taken to a quiet location for assent and to complete a semi-structured interview.

The interview began with general rapport building questions about the child's likes and dislikes. Then a temporal knowledge interview was administered. Questions were designed after those commonly asked of suspected child victims (Orbach & Lamb, 2007). Children were first asked how old they were, and the date of their birthday (see Wandrey et al., 2012, for relevant results). Most children answered these questions correctly, with few age differences emerging (e.g., 6 year olds were slightly less accurate). Of relevance to the current study were two location questions about the present: (1) "Right now, is it near your birthday?" and (2) "Right now, is it before or after your birthday?"

Children were then asked about one of two potentially significant past events (events were randomly assigned across age and gender): visits to dependency court or placement experiences. These events were selected for their salience as well as their potentially repeated nature. For each event, children were asked about the first and last time the event occurred (order counterbalanced). Children who reported only one prior court visit or placement were asked only about that one, referred to as first or last visit/placement in random order (age and gender distributed approximately equally throughout).

Children asked about visits to court (N = 85; Mean age 8-6; 43 female) were given the following description to ensure they understood what was meant by visiting court: "You are in the court building now. This part of the court building is called shelter care, and it is where you wait to go to court. The courtroom or court where you go today is upstairs in this building." After the description, children were asked temporal questions about their first and last court visit, such as their age at each visit, and the season, month, and time of day of each one (see Wandrey et al. 2012). Two temporal localization questions, that is, questions of interest here, were

included: (1) whether their [first/last] visit to court was near their birthday, and similarly (2) whether their [first/last] visit was before or after their birthday.

Children in the placement condition (N = 82; Mean age = 8-6; 42 female) were asked the same questions, but in reference to their first and last placement, defined as, “Most of the kids in this court had to stop living with the people they had lived with when they were a baby. They had to go live with a relative or a foster home or some other grownups. I want to know about the first [last] time that you can remember having to go live somewhere else with someone else.” Initial cohabitation with their biological parent(s) was not considered a placement. To verify to which placement children were referring, children were also asked where and with whom they had lived for each one (verification was done after the interviews, when data were coded). A majority of children was accurate in their descriptions (Wandrey et al., 2012). Of interest here were the temporal localization (near, before/after) questions about the first and last placements.

Once the interviews were completed, children were thanked for their participation, given a small prize, and returned to the daycare facility. Interviews were then coded by trained, reliable raters (see Wandrey et al., 2012).

Results

Preliminary Analyses

Preliminary analyses were conducted to examine gender and differences in responses and distribution of birthdates and interview dates. No gender differences were found in children’s responses to questions about the present or past events. Nor were any gender differences found in the distribution of the month of birthday or interview. Because there were no significant differences, gender was not considered further. Additionally, preliminary analyses confirmed no gender or age differences between participants assigned to the court and placement conditions.

Localization and Landmark Use in the Present

First, how well children answered the two present-focused localization questions in relation to the cyclical, well-known, and often used landmark event-- their birthday—was examined. As mentioned, children’s localization abilities were expected to improve with age, though a prospective bias in their answers was also anticipated, with children tending toward their upcoming rather than past birthday in localizing the present, even when their past birthday was relatively recent.

Proximity. To examine children’s responses to the question about whether it was near their birthday, children were divided into 3 groups based on the timing of their birthday relative to the interview date: 1) children whose birthdays had occurred in the 30 days prior to the interview, 2) children whose birthdays were going to occur in the 30 days following the interview and 3) children whose birthdays were farther in the past or future from the interview (i.e., between 2-10 months). Children’s responses to the proximity question were then compared across groups via a chi-square test to examine whether children answered differently depending on whether it was within a month of their birthday and whether children exhibited a prospective bias.

The groups significantly differed, $\chi^2(2, N = 160) = 17.264, p < .001$: Children were more likely to answer yes, indicating that it is near their birthday, when their birthday fell either 30 days before or 30 days after the interview date than if their birthday occurred farther in time from the interview. Of the 10 children whose birthday was 30 days or fewer before the interview, 60% assented. Of the 12 children whose birthday would take place within 30 days following the interview, 83% assented. However, of the 138 children whose birthday did not fall within 30 days before or after the interview, only 29% assented. Thus, children indeed had some basic

understanding of the concept of near. However, no prospective bias was evident, indicated by the percentages for the two groups within 30 days being fairly comparable in their likelihood of saying yes.

Because the initial analyses did not take into account children's current age, which was expected to influence their responses, children were divided into two age groups via median split, and reconducted the χ^2 tests separately for each age group. The delay differences remained significant for younger, $\chi^2(2, N = 74) = 8.417, p = .015$, and older children, $\chi^2(2, N = 86) = 8.692, p = .013$, and the pattern was identical to that in the full sample. Children were more likely to say yes, that their birthday is near the interview, if their birthday was within 30 days before or after the interview than if their birthday was not. Although the samples were small, for the younger children, 60% (3 of 5) of the children whose birthday fell in the 30 days prior to the interview said yes and 75% (3 of 4) of the children whose birthday fell in the 30 days following the interview said yes, whereas only 22% (14 of 65) of the children whose birthday did not fall within 30 days said yes. For the older children, 60% (3 of 5) of those whose birthday fell in the 30 days prior to the interview said yes and 86% (7 of 8) of those whose birthday fell in the 30 days following said yes, while only 36% (26 of 73) of those in the remaining group said yes.

Because the 30 day cut off for the delay groups was somewhat narrow, delay was expanded to create three groups based on a 90 day cut off. Children's birthday thus fell in the 90 days before, or in the 90 days after or outside of this range (the 6 months "middle period). Using a 3-month cut off is somewhat routine in other interview settings with children and families, such as when they are asked about health and behavior or life events (Huntington, et al., 2011) and thus was of interest here. Responses again differed significantly by group, $\chi^2(2, N = 160) = 32.712, p < .001$. As shown in Table 1 (Appendix A), children whose birthday occurred in the 90

days following the interview answered yes, it is near, far more often than children in the other two groups, that is children whose birthday was 90 days or fewer prior to the interview, and children whose birthday fell outside of the 90 day before or after range. In addition, the latter two groups were both more likely to answer no, indicating it is not near their birthday, than yes. These trends seem to suggest that, sometime in the 90 days following their birthday, but after the first 30 days, children orient towards their upcoming, rather than past, birthday, that is, they begin to exhibit a prospective bias.

The 90-day group analyses, repeated separately for the two age groups, indicated that, while both younger and older children displayed some understanding of near, the prospective bias was only present in the older children. Younger children whose birthday would be taking place between 90 days before or after the interview were more likely to say yes than were younger children whose birthday was farther from the interview date, $\chi^2(2, N = 74) = 12.842, p = .002$. Older children whose birthday fell in the 90 days following the interview were far more likely to say yes it is near than not, whereas children whose birthdays fell in the 90 days prior to the interview and children whose birthdays did not fall within 90 days were both far more likely to say no it is not (Appendix A, Table 1), $\chi^2(2, N = 86) = 20.929, p < .001$.

Sequencing. Chi-square tests were next conducted to evaluate children's responses to the question about whether it was before or after their birthday. First, the 30-day timeframe groups, that is, children whose birthday was within 30 days before, within 30 days after, or more between 2-10 months from the interview, were compared. The χ^2 was non-significant. Thus across the groups, children were not significantly more likely to say that it was before versus after their birthday. The percentages were as follows: 72% percent of children for whom their birthday had occurred within 30 days prior to the interview answered after, with slightly smaller

percentages, 46% of children for whom their birthday would take place within 30 days following the interview and 41% of children for whom their birthday occurred between 2 and 10 months from the interview, answering after.

When the three 90 day delay groups were compared, the model was significant, $\chi^2(2, N = 150) = 7.676, p = .022$. As shown in Table 2 (Appendix A), children whose birthday had occurred no more than 90 days prior to the interview were much more likely to answer “after” than children whose birthdays had occurred following longer time frames. These analyses thus suggest first that children had some general sense of the terms before and after and were not answering at random. And second, hints again of a prospective bias were evident, with children often looking ahead to their next birthday somewhere around three months after their birthday had past.

Of note, when children were divided by age and the analyses were reconducted, no significant effects emerged for either age group, younger and older. However, as can be seen in Table 2 (Appendix A), the older children’s percentages were suggestive of the prospective bias, and the non-significant finding could be due to the smaller sample sizes.

In an additional analysis, whether children’s answers to the question about whether it was before or after their birthday were influenced by where their birthday and interview fell in relation to the calendar year was explored. Two groups of children were created: those whose birthday had taken place between January and the interview date, and children whose birthday had not yet taken place but would occur between the interview date and the end of December. Of the 51 children whose birthday occurred between January and the interview, 65% said it was after their birthday. Of the 99 children whose birthday had yet to take place, 33% said after. These percentages significantly differed, $\chi^2(1, N = 150) = 13.445, p < .001$. Similar trends

emerged when the two age groups were examined separately: younger $\chi^2(1, N = 67) = 7.081, p = .012$ and older $\chi^2(1, N = 83) = 7.250, p = .013$. Accordingly, at least some facets of children's understanding of the terms before and after seem to be linked temporally to where events fall in the calendar year.

Localization and Landmark Use in the Past

Together, the initial analyses reveal some basic competencies in children's general understanding of localization terms, at least when children were asked to localize the present in relation to landmark events. Such competencies, however, say little about whether children can localize events in the past, including in relation to landmark events. The second primary aim of the study, therefore, was to investigate how children responded to temporal localization questions about past events.

Half of the children were asked localization questions about court visits and half were asked about placements, and children's responses to the two types of questions were analyzed separately. Of note, across analyses within each event (court visits, placements), the Ns varied slightly because children who said "I don't know" were excluded, as were children who were missing data due to interviewer error (asking about the wrong event) or children being non-responsive. Because of the smaller sample sizes, only 90-day groups (and not the 30-day groups) were created and then compared. These groups were as follows: children for whom their birthday had taken place within 90 days prior to most recent court visit/placement, children for whom their birthday would take place within 90 days following their court visit/placement, and children for whom their birthday was 4-8 months from their court visit/placement.

Proximity. Children were asked whether their more recent court visit was near their birthday. Children's responses (yes/no) were then compared across the three 90-day groups. The

chi-squared was significant, $\chi^2(2, N = 68) = 14.448, p = .001$. Similar to children's responses to questions about whether it was presently near their birthday, as shown in Table 3 (Appendix A), children whose birthday occurred within 90 days following their last court date were more likely to say "near" than children whose birthday occurred in the 90 days prior to their last court date and than children whose birthday did not occur within these time spans. When children were split by age into younger and older groups, nearly identical patterns emerged, though for the younger children, the χ^2 was only marginally significant, likely due to the reduced sample size: younger children, $\chi^2(2, N = 28) = 5.843, p = .054$; and older children $\chi^2(2, N = 40) = 9.076, p = .011$).

When similar analyses on responses about whether children's most recent placement change had taken place near their birthday were conducted, the chi-square was non-significant, including when conducted separately by age (Appendix A, Table 4). Thus, some evidence that children understood and were responding accurately to questions about near emerged, but only when children were referencing court visits.

Sequencing. Similar sets of chi-square analyses were conducted to examine children's ability to sequence events in the past compared to landmark events. Children's responses regarding whether their last court visit/placement occurred before or after their birthday were compared across the three 90-day delay groups: those whose birthday had taken place no more than 90 days prior to the interview, those whose birthday would be taking place within 90 days following, or 4-8 months away. Analyses then compared the two calendar year groups: children whose birthday had taken place between January and their last court visit or placement, and children whose birthday would take place between their last court visit/placement and December. Across analyses, only one significant effect emerged (Appendix A, Table 5, Table 6). When

younger children's responses to the question about whether their birthday was before or after their last court visit, those who were interviewed in the 90 days after their birthday were more likely to say it was after than both children who were interviewed in the 90 days before their birthday and children who were interviewed more than 90 days from their birthday, $\chi^2(2, N = 28) = 6.892, p = .032$. Although this trend is consistent with a prospective bias, because it only emerged in one of the analyses and only with the younger children, we hesitate to place strong interpretation on the trends.

Discussion

The goal of this study was to examine the development of temporal localization skills in maltreated children, a population of critical importance in forensic and legal settings. Specifically, the study examined maltreated children's ability to answer questions using common temporal terms about past and present events. Overall, children seemed to have an understanding of the terms near, before and after. However, their understanding was not necessarily what would be expected from past studies (Friedman, 1977; Friedman, 1991; Friedman & Kemp, 1998; Pathman et al., 2013). Specifically, children's temporal understanding appeared to depend on both the timing and type of event in question itself as well as the cyclical nature of landmark events to which the event is being compared.

Temporal Location about the Present

First, several interesting and potentially significant findings emerged regarding children's distance and sequencing abilities with regard to the present. As expected, a majority of children appeared to understand and be able to answer temporal localization questions about present events. Both younger and older children could reliably indicate whether it was near or not near their birthday using 30 and 90 day cut offs to consider their birthday actually near the interview.

However, results were not as clear when children were asked about whether it was before or after their birthday, although a trend certainly hinted that children had a basic understanding of before/after sequencing terms and could apply them when making comparisons between the present and a landmark event. This indicates that, as suggested in prior research (Friedman, 1992), children are learning temporal information from socialization, beyond concrete terms and time scales, and even early on are picking up on a socially agreed upon meaning of more nuanced and relative temporal judgments like before, after and near.

Related to children's general ability to sequence were findings suggesting that children's use of before and after terms was affected by where events fell relative to each other or fell in the present as related to the calendar year. The potential influence of the calendar year on children's judgment differs from Friedman & Kemp's (1998) suggestion that children in fact do not rely on temporal patterns the way adults do. However, Friedman & Kemp's study focused on relative recency, which may prompt a different reasoning process than before/after question. Additional research in this area is needed to determine the reasons that might underlie this difference.

Older children's understanding is also impacted by the cyclical nature of events, particularly when events are separated by a longer period of time. Older children displayed a prospective bias when answering temporal localization questions, partially supporting my hypothesis. When asked to localize their birthday relative to the present, older children began to orient to the future sometime in the 30-90 days after their birthday had passed and answer localization questions based on their upcoming birthday. While it is not clear from this particular study why this bias exists and why it exists only in older children it is possible that older children develop this bias as they develop a more complex understanding of the future and orient in that direction. Prior studies have documented difficulty with temporal judgments involving cyclical

events in younger children, age 5-7, when judging the relative distance of holidays and birthdays (Friedman et al., 1995; Friedman & Kemp, 1998). It is possible that the maltreated children in this sample were simply delayed in displaying this difficulty, because of cognitive or other delays. Or the differences observed may be due to differences in the nature of the events used in the studies and prospective bias may explain both the errors observed in prior studies and in the present study, and future research should explore this area in more detail.

Temporal Localization and the Past

Whether and how children understood temporal localization questions about past events was less clear. The results hint that there was some understanding. However, given that the events were likely salient and general fairly recent, the hints are tentative, and they were not consistent for questions about court visits and placements. Children seemed to fare better with questions about court visits than placements. Court visits represent distinct occurrences, while placement changes, though unique, are not distinct time limited occurrences, in that there is little to offset the event or day of the change from the ongoing placement. Thus, children's localization abilities or sense of when the actual change took place may be blurred by their general memory of being in that environment. Because the court visit was relatively short with a specified beginning and end, localization may have been easier.

Although the study revealed trends suggestive of localization memory in maltreated children, the study also highlighted a fair proportion of maltreated children who did not demonstrated any such proficiencies, knowledge, or memory. For example, one fifth to one third of children whose birthday occurred more than three months from the interview date indicated it was near their birthday, and a handful of children whose birthday was within 1 or 3 months of the interview reported that it was not near their birthday. The number of children who one might

say, “erred,” or at least did not appear to be able to localize events increased when their ability to answer localization questions about past events, rather than the present. While there is little or no data on how adults understand these terms, even if we assume that all adults understand “near” in the same or a highly similar way or treat cyclical events the same way when judging localization, it appears that children do not have sufficiently consistent understanding to make answers to localization questions meaningful for accurately pinpointing dates. In addition, the differences between results on children’s localization in the past versus present results indicate that an understanding or ability to answer such questions about the present is not necessarily indicative of the ability to answer such questions in the past.

These results differ in some respects from prior studies, which found more robust results even in younger children (Friedman, 1977; Friedman, 1991; Friedman & Kemp, 1998; Pathman et al., 2013). This may be due to the differences in the types of past events used and the length of delay between events. Prior studies have generally used unique, discrete events and have questioned children after relatively short delays, of a few weeks to no more than a few months. The past events used in this study are not as discrete, in the case of placement, or unique, in the case of court visits. Further, there was generally a longer delay between events and events and interviews in the present study than there has been in past studies.

Turning to legal implications of the results, the wide variability in children’s responses and possible interpretation of localization terms, combined with the prospective bias that emerged with age, has two important and interrelated implications. First, questions about whether events in the present—or past—are near or before or after landmark events, quite frankly, should not be asked of children to establish factual details regarding an alleged crime. Some children may be able to answer such questions about the present, but, as mentioned, such

answers say little about their answers in regard to past events. And second, children's answers to localization questions should not be considered as accurate or inaccurate legal settings. That is, children's temporal localization responses say little about the veracity of an event, but instead, may simply offer insight into general ranges within which an event may have occurred. If such questions are avoided, though, then children's responses will not need to be evaluated. Yet, children can and do accurately remember past events and can convey a range of information under the right conditions (Friedman, 1991; Friedman, 1992; Friedman & Kemp, 1998). Thus courts may need to find other ways of localizing events, methods that do not rely on relative judgments made by children in response to ambiguous or personally defined terms ("near") or on comparisons to cyclical events

It is not clear from this study whether there might be ways of improving children's understanding to make their answers more useful. Nor is it clear how children actually define near themselves, and whether differing definitions or inaccuracies in recalling the timing of an event are behind the variability in children's answers. Future studies would need to examine this issue, as well as whether children's understanding might differ based on context. It appears from prior research that the use of time scales and visual cues may help children sequence events (Friedman, 1977; Friedman & Kemp, 1998). Such visual cues might include visual representations of time scales or asking children to place visual representations of events in order or on a time scale rather than answering verbally. However, there is little indication that these strategies would help with subjective judgments such as "near" or address the difficulty caused by the use of cyclical landmark events, particularly given that children are often unable to remember the exact month of past events or otherwise use time scales to accurately judge the distance between two past events.

In closing, the present study offers new insight into children's development of temporal localization skills. Theoretically, this study expands on current research by examining children's understanding of a more subjective temporal term, near, as well as children's ability to make past and present temporal judgments using cyclical events. The study also has practical implications for the use of temporal questions in legal and forensic settings. Results indicate that while children do have basic temporal localization skills, commonly used temporal questions may not be suitable for these settings. These results highlight the need for continued research not only into children's emerging temporal localization abilities, but also into whether and how much those abilities can be improved when accuracy and precision are needed.

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APPENDIX A: Tables of Results

Table 1

Children's Answers to Proximity Questions About the Present

| | Timing of Birthday Relative to Interview | | |
|-------------------------------|--|--------------------------|----------------|
| Is it near your birthday now? | Within the 90 days before | Within the 90 Days After | >90 Days After |
| Overall | | | |
| No | 25 (67.6%) | 11 (28.2%) | 68 (81%) |
| Yes | 12 (32.4%) | 28 (71.8%) | 16 (19%) |
| Total | 37 (100%) | 39 (100%) | 84 (100%) |
| Younger | | | |
| No | 10 (55.6%) | 4 (40%) | 40 (87%) |
| Yes | 8 (44.4%) | 6 (60%) | 6 (13%) |
| Total | 18 (100%) | 10 (100%) | 46 (100%) |
| Older | | | |
| No | 15 (78.9%) | 7 (24.1%) | 28 (73.7%) |
| Yes | 4 (21.1%) | 22 (75.9%) | 10 (26.3%) |
| Total | 19 (100%) | 29 (100%) | 38 (100%) |

Table 2

Children's Answers to Sequencing Questions About the Present

| | Timing of Birthday Relative to Interview | | |
|--|--|--------------------------|----------------|
| Is it before or after your birthday now? | Within the 90 days before | Within the 90 Days After | >90 Days After |
| Overall | | | |
| Before | 13 (36.1%) | 23 (60.5%) | 48 (63.2%) |
| After | 23 (63.9%) | 15 (39.5%) | 28 (36.8%) |
| Total | 36 (100%) | 38 (100%) | 76 (100%) |
| Younger | | | |
| Before | 7 (41.2%) | 7 (77.8%) | 25 (61%) |
| After | 10 (58.8%) | 2 (22.2%) | 16 (39%) |
| Total | 17 (100%) | 9 (100%) | 41 (100%) |
| Older | | | |
| Before | 6 (31.6%) | 16 (55.2%) | 23 (65.7%) |
| After | 13 (68.4%) | 13 (44.8%) | 12 (34.3%) |
| Total | 19 (100%) | 29 (100%) | 35 (100%) |

Table 3

Children's Answers to Proximity Questions About Past Court Visits

| <i>Timing of Birthday Relative to Last Court Visit</i> | | | |
|--|----------------------------------|---------------------------------|--------------------------|
| <i>Was your last court visit near your birthday?</i> | <i>Within the 90 days before</i> | <i>Within the 90 Days After</i> | <i>>90 Days After</i> |
| Overall | | | |
| No | 17 (94.4%) | 5 (45.5%) | 35 (89.7%) |
| Yes | 1 (5.6%) | 6 (54.5%) | 4 (10.3%) |
| Total | 18 (100%) | 11 (100%) | 39 (100%) |
| Younger | | | |
| No | 6 (100%) | 3 (50%) | 14 (87.5%) |
| Yes | 0 (0%) | 3 (50%) | 2 (12.5%) |
| Total | 6 (100%) | 6 (100%) | 16 (100%) |
| Older | | | |
| No | 11 (91.7%) | 2 (40%) | 21 (91.3%) |
| Yes | 1 (8.3%) | 3 (60%) | 2 (8.7%) |
| Total | 12 (100%) | 5 (100%) | 23 (100%) |

Table 4

Children's Answers to Sequencing Questions About Past Court Visits

| <i>Timing of Birthday Relative to Last Court Visit</i> | | | |
|---|----------------------------------|---------------------------------|--------------------------|
| <i>Was your last court visit before or after your birthday?</i> | <i>Within the 90 days before</i> | <i>Within the 90 Days After</i> | <i>>90 Days After</i> |
| Overall | | | |
| Before | 7 (46.7%) | 8 (72.7%) | 25 (62.5%) |
| After | 8 (53.3%) | 3 (27.3%) | 15 (37.5%) |
| Total | 15 (100%) | 11 (100%) | 40 (100%) |
| Younger | | | |
| Before | 1 (20%) | 4 (66.7%) | 14 (82.4%) |
| After | 4 (80%) | 2 (33.3%) | 3 (17.6%) |
| Total | 5 (100%) | 6 (100%) | 17 (100%) |
| Older | | | |
| Before | 6 (60%) | 4 (80%) | 11 (47.8%) |
| After | 4 (40%) | 1 (20%) | 12 (52.2%) |
| Total | 10 (100%) | 5 (100%) | 23 (100%) |

Table 5

Children's Answers to Proximity Questions About Past Placements

| Timing of Birthday Relative to Last Placement | | | |
|---|---------------------------|--------------------------|----------------|
| Was your last placement near your birthday? | Within the 90 days before | Within the 90 Days After | >90 Days After |
| Overall | | | |
| No | 11 (78.6%) | 14 (45.5%) | 26 (89.7%) |
| Yes | 3 (21.4%) | 9 (54.5%) | 7 (10.3%) |
| Total | 14 (100%) | 23 (100%) | 33 (100%) |
| Younger | | | |
| No | 7 (100%) | 5 (50%) | 13 (76.5%) |
| Yes | 1 (0%) | 5 (50%) | 4 (23.5%) |
| Total | 8 (100%) | 10 (100%) | 17 (100%) |
| Older | | | |
| No | 4 (66.7%) | 9 (69.2%) | 13 (81.3%) |
| Yes | 2 (33.3%) | 4 (30.8%) | 3 (18.8%) |
| Total | 6 (100%) | 13 (100%) | 16 (100%) |

Table 6

Children's Answers to Sequencing Questions About Past Placements

| Timing of Birthday Relative to Last Placement | | | |
|--|---------------------------|--------------------------|----------------|
| Was your last court visit before or after your birthday? | Within the 90 days before | Within the 90 Days After | >90 Days After |
| Overall | | | |
| Before | 7 (50%) | 13 (68.4%) | 16 (55.2%) |
| After | 7 (50%) | 6 (31.6%) | 13 (44.8%) |
| Total | 14 (100%) | 19 (100%) | 29 (100%) |
| Younger | | | |
| Before | 4 (66.7%) | 4 (57.1%) | 6 (40%) |
| After | 2 (33.3%) | 3 (42.9%) | 9 (60%) |
| Total | 6 (100%) | 7 (100%) | 15 (100%) |
| Older | | | |
| Before | 3 (37.5%) | 9 (75%) | 10 (71.4%) |
| After | 5 (62.5) | 3 (25%) | 4 (28.6%) |
| Total | 8 (100%) | 12 (100%) | 14 (100%) |