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MALTREATED CHILDREN'S ABILITY TO ESTIMATE TEMPORAL LOCATION AND NUMEROSITY OF PLACEMENT CHANGES AND COURT VISITS

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Research examining children's temporal knowledge has tended to utilize brief temporal intervals and singular, neutral events, and is not readily generalizable to legal settings in which maltreated children are asked temporal questions about salient, repeated abuse that often occurred in the distant past. To understand how well maltreated children can describe temporal location and numerosity of documented, personal experiences, we assessed 167 6- to 10-year-old maltreated children's temporal memory for changes in their living arrangements and prior visits to court. Small percentages of children were capable of providing exact temporal location information (age, month, or season) regarding their first or last placement or court experience, or numerosities for placements or court visits. Greater knowledge of current temporal locations did not predict better performance. However, older children's performance for several temporal judgments was better than chance, and their reports were not largely discrepant from the truth. Findings suggest caution when questioning maltreated children about when and how many times prior events occurred.

Keywords: temporal knowledge, numerosity, children, memory, maltreatment

Allegations of child abuse, particularly sexual abuse, often rely heavily on a child's testimony. Corroborative evidence is rare, and the child is usually the only eyewitness. Moreover, abuse prosecuted in court is most often repeated over extended periods of time, and delays in disclosure are common (Connolly &

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Read, 2006; Goodman et al., 1992). One recurrent difficulty when allegations arise is determining precisely when and how many times the abuse occurred. Without any attempts to survey the child developmental literature, courts often assert that children ought to be capable of dating events according to their age at the time of an event, their year in school, or what teacher they had (In the interest of K.A.W., 1986; Ministry of Justice, 2011; Queensland Law Reform Commission, 2000). Indeed, questions reflecting these expectations are routinely asked of children in forensic interviews (Orbach & Lamb, 2007; Powell, Roberts, & Guadagno, 2007) and in court (R. v. R.W., 2006; U.S. v. Tsinhnahijinnie, 1997). Children are regularly asked to estimate numerosities in interviews and court as well (Guadagno & Powell, 2009; Lyon & Saywitz, 2006).

Despite the legal significance of temporal and numerosity information for child abuse cases, virtually nothing is known about children's ability to provide accurate information about repeated, emotionally charged events occurring over long intervals of time. The purpose of the present study was to provide this knowledge. We asked maltreated 6- to 10-year-olds under the jurisdiction of juvenile court to estimate the temporal location and numerosity of two potentially salient, documented repeated experiences: changes in placement and courthouse visits. Before turning to the research, we discuss the legal significance of temporal and numerosity information in the prosecution of child abuse and review relevant literature concerning children's ability to estimate temporal locations and event numerosities.

A review of several English-speaking common law nations (Australia, Canada, New Zealand, U.S., and the U.K.) reveals a number of ways in which temporal information is important for the prosecution of abuse. Defendants are entitled to be given adequate notice of the charges against them, which requires that the state provide as precise a description of the characteristics of the offense as possible (European Convention on Human Rights, 1950; Queensland Law Reform Commission, 2000; Valentine v. Konteh, 2005). Although the courts are often sensitive to children's difficulties in dating events (Myers, 2005; R. v. B.(G.), 1990), and precise dates are not required, there is still the expectation that the state attempt to elicit temporal information and establish a temporal range within which the abuse occurred (Myers, 2005; R. v. MacNeil, 1998; Richardson, 2006). The courts mention a number of respects in which defendants are prejudiced by a lack of temporal specificity, including an inability to claim an alibi defense and an inability to challenge the child's testimony with respect to circumstances surrounding the alleged abuse (Queensland Law Reform Commission, 2000).

When defendants argue that the charges are unfairly imprecise with respect to time or number, the courts are often required to make legal judgments based on their intuitions about the psychology of temporal estimation. In the U.S., when deciding whether an indictment is sufficiently specific, trial courts may be instructed to consider the age and intelligence of the child witness, the efforts made by the prosecution to narrow the temporal interval, and the length of time between the alleged crime and the indictment and arrest of the defendant (Connolly, 1990; State v. Baldonado, 1998). With little research to guide their decisions, courts speculate about the abilities of children at various ages to estimate time, the efficacy of various methods for eliciting temporal judgments, and the effects of delay on temporal estimation.

If a specific temporal interval is charged, then problems may arise for the prosecution if the child testifies to a different interval. This may lead the trial court to direct the jury to acquit the defendant (Davis, Hoyano, Keenan, Maitland, & Mogram, 1999), particularly if the defendant raised a valid defense with respect to the date actually charged (Myers, 2005). The defendant's right to be indicted by a grand jury, which exists in United States federal courts and a number of state courts (Lafave, Israel, & King, 2000), means that a conviction may be overturned if the temporal interval proved at trial is substantially different than the interval specified in the grand jury's indictment (U.S. v. Tsinhahijinnie, 1997).

The child's age at the time the abuse allegedly occurred may also determine what sex crime should be charged, since statutes often make distinctions among offenses against children of different ages (Australian Law Reform Commission, 2010; Bradley, 2007; R. v. Radcliffe, 1990). Moreover, the child's competency to testify at trial requires that the child be able to recall and relate events contemporaneous with the crime in question (Lyon, in press); therefore uncertainty about the timing of the abuse may lead to a finding of incompetency (In the matter of Dependency of A.E.P., 1998). Finally, the defendant is typically allowed to question the child about temporal details, on the grounds that the child's responses are relevant in assessing his or her credibility (State v. Taylor, 2005).

With respect to numerosity, indictments based on the commission of multiple crimes (or multiple violations of a single crime) are enumerated as counts. Individual acts must be specified so that the jury can accept or reject specific counts (S v The Queen, 1989; Valentine v. Kontoh, 2005). If a single count identifies more than one criminal act, it is deemed duplicitous (Richardson, 2006), and there is the danger that the jury will convict despite the fact that they do not agree that a specific act was committed (State v. Saluter, 1998). Even if the count is not duplicitous, the child's testimony may create problems of nonunanimity if he or she testifies to more acts of abuse than were charged (S v The Queen, 1989). The child's testimony as to numerosity is also tested as a means of assessing credibility, and if the child testifies to what appears to be an impossible number, then a conviction may be overturned (Connolly & Read, 2003). Some countries have relaxed the numerosity requirements with respect to child victims; those reforms are taken up in the discussion.

Empirical research regarding children's temporal abilities is only somewhat helpful in guiding the courts. Temporal location refers to places in time patterns, such as clock-time, months, and years. In order to estimate the temporal location of events, individuals use a reconstructive process in which they combine their knowledge about time patterns with contextual information recalled about an event to infer when that experience took place (Friedman, 1993). Children may have difficulty with each aspect of this process: Their memory may be poor for prior events, limiting the amount of contextual information upon which they can draw for time-relevant details. Children also have limited understanding of conventional time patterns (clock-time, days, weeks, months, and years) until they are taught this information, which occurs gradually during the primary school years. Finally, children may lack the executive functioning abilities necessary to coordinate episodic recall with their knowledge of time patterns (Friedman & Lyon, 2005).

A fair amount of research has examined children's understanding of conventional temporal concepts. First, and as would be expected, children are highly attuned to their current age. In fact, in normative samples of children, a majority of 4-year-olds know their birthday month (Friedman, 1992). Second, and similarly, most 4-year-olds can identify the current season, and most 6-year-olds can identify the current month (Friedman, 1992). Related, Tartas (2001) asked 4- to 10-year-olds questions about repeated events (e.g., When does school start? When does Christmas happen?). By age 6, children frequently referred to seasons, and by 8, children referred to months of the year. The ability to use language referring to conventional temporal locations to associate events to the present time, however, does not mean that children can provide accurate temporal location information for prior events. In order to make such judgments, children must understand that most conventional temporal terms refer to recurrent cycles, such that one element of a cycle is both before and after another. Children do not appear to have a good understanding of this fact until about 8 years of age (Friedman, 1978).

A paucity of research has examined children's ability to provide temporal location information about experienced events (Friedman, 2003). In two studies, 4- to 13-year-olds were asked to date staged events that occurred 7 weeks or 3 months previously (Friedman, 1991; Friedman & Lyon, 2005). Although even many of the 4-year-olds were able to reconstruct the time of day during which events occurred, children up to 13 years of age had considerable difficulty with longer time scales, such as months or seasons, and these difficulties increased with longer retention intervals. Two other studies assessed children's ability to date events following longer delays. Bauer, Burch, Scholin, and Guler (2007) asked 7- to 10-year-olds to report their age and the season when 14 self-selected events occurred. Children were 89% correct in judging their age and 79% in judging the season. However, children virtually always generated events that had occurred less than 3 years previously, and 72% of the events were less than 2 years old, making it unclear whether similar levels of accuracy would emerge for events in the more distant past. Friedman, Reese, and Dai (2011) asked 8- to 12-year-olds temporal location questions about parent-nominated events that had occurred between 6 months and 4 years previously. "Considerable accuracy, along with weak age differences" emerged (p. 162). Children were consistently above chance in identifying the month and season of the events, and accuracy did not decline with increasing delay. Moreover, children's judgments about the year of the events differed from their parents by only 3 months for events up to 2 years old, and by 8 to 9 months for events 2 to 4 years ago. Percentage accuracies were not reported for the year judgments, but at least 20% of the children provided accurate year and month judgments for even the most remote events.

In one other study that examined children's temporal memory for a prior experience, Peterson (1996) questioned 2- to 9- year olds about a visit to the hospital emergency room for a traumatic injury that occurred 6 months previously. Because emotionally intense events tend to be remembered better than neutral events (Quas & Fivush, 2009; Reisberg & Hertel, 2004), one might assume that children's temporal abilities were better for this significant event than for other, more mundane experiences. However, better memory for events does not predict better temporal estimation (Friedman & Lyon, 2005; Friedman et al., 2011). Indeed, Peterson found that, despite children evincing clear memory for the former hospital visit, children provided little or no temporal location information about their experience until 9 years of age, and across age, children were particularly poor at reporting the time of day the injury occurred and the time they arrived at the hospital when directly asked. The limitations in children's temporal abilities were thus likely a result of limited knowledge of conventional time concepts or limited ability to link that information to their recollection.

In attempting to apply these findings to legal settings and predict whether children can provide temporal location information for abuse, the repetitive nature of most abuse must be taken into account. In order to minimize potential confusion, research has tended to examine parent- or self-selected events that were either nonrepeated or at least individually identifiable (Bauer et al., 2007; Friedman et al., 2011). As a consequence, it is unclear how children attempt to temporally locate the first or the last event in a series of similar events. In one of the only studies with relevant data, Orbach and Lamb (2007) evaluated forensic interviews of 4- to 10-year-olds alleging sexual abuse and found that, although children provided temporal location information both spontaneously and in response to temporal questions, children "mostly referenced short-scale time patterns or anchored their memories to familiar daily activities" (p. 1116). Furthermore, children's accuracy could not be determined, highlighting the need for systematic research on children's temporal abilities for repeated and salient documented experiences.

Finally, virtually no research has examined children's ability to enumerate experienced events, although two related lines of work provide the basis for at least tentative predictions about this ability in children. One body of work has examined children's ability to enumerate simple stimuli (e.g., words in a list, actions in a story, sounds) repeated over short intervals. Although some studies have found that children's ability to report how often the stimuli appeared emerges around age five and is relatively stable thereafter (Hasher & Zacks, 1979; Ellis, Palmer, & Reeves, 1988), other research has found improvement with age (e.g., Chalmers & Grogan, 2006; Lund, Hall, Wilson, & Humphreys, 1983; Marx, Kim, & Henderson, 1997; McCormack & Russell, 1997).

A second body of work has examined adults' numerosity judgment abilities. In contrast to the research with children, the research with adults has evaluated numerosity judgments for events that are both more complex and occur over longer periods of time. This research has consistently found that adults use a number of different strategies in reporting event numerosity, and that their strategy is influenced by the nature of the events (e.g., number, distinctiveness, frequency, regularity; Brown, 2002; Haberstroh, 2008). For example, if the number of occurrences is large, adults are more likely to estimate numerosity based on their inferences about event frequency and the time period over which the events occurred, rather than by retrieving and counting individual occurrences (Bradburn, 2000; Menon & Yorkston, 2000).

When attempting to extrapolate findings from these two lines of work to children's ability to enumerate personally experienced events, it is important to consider children's limited working memory and inferential abilities (Case & Sowder, 1990; Flavell, Flavell, & Miller, 1993). Although even young children might be quite proficient at estimating numerosity when presented with simple stimuli during brief intervals, they may have more difficulty when enumerating more complex events that occur over longer periods of time. The need to recall individual events and mentally count implicates several aspects of memory, including recall and working memory. Inferential numerosity judgments require one to coordinate one's inferential abilities with knowledge about conventional temporal concepts. As the difficulty of the task increases, developmental differences appear more likely.

As a final note, to understand how well children involved in legal cases can answer temporally relevant questions, it is necessary to assess temporal memory for emotionally salient, well-documented, and datable events. Maltreated children under the jurisdiction of the juvenile court frequently experience two types of such events: changes in placement (including the initial removal from home) and court visits. Removal occurs after a report of child maltreatment has been substantiated by social services, and changes in placement tend to follow difficulties in the placement or changes to a preferred placement. These changes are often (if not usually) extremely distressing (Cooper, Peterson, & Meier, 1987; Newton, Litrownik, & Landsverk, 2000; Rubin et al., 2004). Children are taken from the custody of their current caretakers, initially a parent or legal guardian, and are placed in foster homes with strangers, often separated from siblings (US DHHS, 2010). Children must adjust to a new setting with new rules and family members. Children often change schools and need to establish new friends, meet a new teacher, and navigate a novel school environment, all of which can be quite stressful (Weinberg, Weinberg, & Shea, 1997). Regarding court visits, although many children do not appear to find such visits especially distressing (Block, Oran, Oran, Baumrind, & Goodman, 2010; Quas, Wallin, Horwitz, Davis, & Lyon, 2009), the visits are often eventful. On the day of their court visit, children miss school. They are picked up in a county vehicle and taken to the courthouse where they wait, usually for several hours, until their hearing is called. They meet with their attorney and often speak to the judge. They are likely to see their siblings and to have monitored visitation at the courthouse with their parents. Because both placement changes and court visits are documented, the accuracy of children's temporal judgments can be verified. Moreover, by studying maltreated children, insight into temporal memory abilities of precisely the children most likely to be questioned in court can be gleaned.

Present Study

In the current study, we interviewed maltreated 6- to 10-year-olds about their current temporal location knowledge (age, birthday, month, and season) and elicited their judgments of the temporal location of changes in placement and prior visits to dependency court. We anticipated that even the youngest children would know their age and birthday, and that awareness of the current month and season[1] would show developmental improvement and be firmly in place by 8 years of age (Friedman, 1991, 1992). Despite our expectation of high awareness of current temporal location, we did not similarly expect high levels of ability to estimate placement changes and court visits, particularly when asked about more remote occurrences, although we did anticipate that children would exhibit developmental improvements in their ability to identify the temporal location of these two events. Finally, despite the lack of prior research specifically examining children's ability to enumerate prior events, research on children's numerosity judgments for simple stimuli and adults' numerosity judgments for past experiences suggests that developmental improvements are likely when recalling complex prior experiences.

Method

Participants

One hundred and 67 maltreated 6- to 10-year-olds (85 female) awaiting a court appearance in the Los Angeles County Dependency Court served as participants (See Table 1). All children had been removed from the custody of their parents or guardians due to substantiated maltreatment. Those who were Spanish-speaking or were unable to communicate or uncomfortable talking with the researcher in English were excluded, as were those who were awaiting an adjudication hearing in which they might testify on the day of their interview. The final sample included 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). Children's ethnicity varied: 53% Latino, 30% African American, 13% non-Hispanic Caucasian, and 1% Asian, largely consistent with the population of children in foster care in Los Angeles County. These percentages were similar across age.

Materials and Procedures

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

Children who met the eligibility requirements were identified in the courthouse's childcare facility and individually invited to an interview room. After obtaining assent, the interviewer established rapport and then administered a temporal knowledge interview.

All children were first asked to state the current season and month, their age, and the day and month of their birthday. Then they were randomly assigned to be asked about either prior changes in placement or visits to dependency court.

Children in the placement condition (n = 82) were told "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 in a foster home or with some other grownups." They were then asked how many places they had lived, and whether

[1] Because the children resided in Los Angeles County where weather changes are infrequent and muted, knowledge of current season might be somewhat impaired.

they had lived in more than one place, more than five places, and more than 10 places. Next, to orient children to the specific event, they were asked to recall the first (or last) time they had moved and to report where they had lived, with whom they had lived, and everything that happened when they moved. They were then asked how old they were and the season and month of the move. These questions were then repeated for children's last (or first) move. Whether children were asked initially about their first or last placement was counterbalanced. If a child had experienced only one placement, whether that event was referred to as the "first" or "last" alternated between children.

Children in the court condition (n = 85) were told, "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." They were then asked how many times they had come to the court building, and whether they had come to the court building more than once, more than five times, and more than 10 times before this visit. Next, they were asked to recall the first (last) time they had come to court and to report everything that happened during that visit. They were then asked the following questions: how old they were and the season and month of the visit (again, questions about first and last were counterbalanced or, if children only experienced one visit, varied in a manner comparable to that used for the placement group). These questions were then repeated for children's last (first) visit to court prior to the current visit.

Coding

Information from children's case files was compared to their interview responses to determine the accuracy of their temporal memory. Two types of scores were calculated: dichotomous accuracy scores and, when possible, discrepancy scores. Of note, for the accuracy scores regarding children's first placement, some children (N = 22) were removed from home prior to the age of 3, that is, an age below the general age cut-off for the offset of infantile amnesia (Bauer, 2009; Pillemer & White, 1989; Winograd & Killenger, 1983). In these cases, children's descriptions of their first placement were compared to placements that occurred after age 3 to determine accuracy of responses. For court visits, children are typically not required to appear at court until age 4; thus, there was no need to identify visits prior to the offset of infantile amnesia.

For ease in interpreting the scores, they are described separately for (a) current temporal knowledge, (b) temporal memory for prior events, and (c) numerosity judgments.

First, for current knowledge, dichotomous accuracy scores were calculated for the questions: "How old are you now?" "When is your birthday?" "What month is it?" and "What season is it?" Responses were coded as '1 = *correc*t' or '0 = *not correct*' (the latter included "don't know" responses). Given that the magnitude of inaccuracies can vary substantially, discrepancy scores were computed for some responses to capture accuracy on a continuum (in contrast to the dichotomous scores), enabling us to examine the degree of inaccuracy (Friedman et al., 2011).

Discrepancy scores were specifically calculated for children's responses to the questions, "What month is it?" and "What season is it?" These scores represent the temporal distance between the correct answer and the children's response. Thus, for example, if the interview took place on January 15th and the child reported "February" when asked what month it is, the number of days between the interview date and the first day of the reported month would be 17 or 0.57 months. If the child reported "December," the number of days between the interview date and the last day of the reported month would be 15 or .50 months. For season, if the child was interviewed on January 15th and the child claimed it was "Spring," the number of days between January 15 and the (approximate) start of Spring on March 20th—would be 64 days or 0.71 seasons. With this coding procedure, correct responses received scores of zero and higher values indicated greater discrepancy or distance between children's response and the actual date. "Don't know" responses were not included.

Second, temporal memory for past events (i.e., age, month, and season) was similarly scored according to the dichotomous accuracy (correct vs. not correct) criterion and the discrepancy between the correct answer and children's responses. Again, for the latter scores, correct responses received a zero and "don't know" responses were excluded. Also, for month and season judgments, it was possible to compare children's performance to chance according to the dichotomous scores. That is, for month and season judgments, chance performance is 8.5% correct (1/12) and 25% correct (1/4), respectively. For the past event analyses, children were divided into two age groups using a median split. The mean age for children in the younger age group was 6.88 (SD = .78; range 6.0 to 8.67) years, and the mean age for children in the older group was 9.22 (SD = .74; range 8.75 to 10.92) years.

Third, the accuracy of children's responses to numerosity questions were coded according to the dichotomous accuracy scores and the discrepancy scores. The latter reflected the difference between children's reported and actual number of placements or court visits.

Results

Preliminary Analyses

To identify potential confounds, we examined whether children's age, gender, and ethnicity varied between the placement and court samples. We then tested whether gender or ethnicity was related to children's temporal memory. Age, gender, and ethnicity were comparable between the placement and court groups, and gender was unrelated to children's temporal accuracy. The ethnic distribution was also comparable across age. Overall, Latino children performed more poorly than did non-Latino children when asked about the current season per the discrepancy score, $t(157) = 2.26$, $p = .025$ and when asked about their birthday month and day per the dichotomous accuracy score, $\chi^2(1, 163) = 5.00$, $p = .025$ and $\chi^2(1, 163) = 6.54$, $p = .011$. However, ethnicity did not interact with age to influence the results, and ethnicity did not account for any of the subsequent findings. Neither gender nor ethnicity is considered further.

Children's age was positively related to the number of placements, $r(82) = .22$, $p = .050$, and court appearances, $r(85) = .40$, $p < .001$, as might be expected. Age was also positively related to the delay in days between the first court visit or placement and the current interview, rs $\geq .37$, ps $< .01$, but not to the delay between the last placement/court appearance and the interview. Delay was included as a predictor in the regressions examining children's prior event discrepancy scores.

Finally, children who answered "do not know" were included in the dichotomous analyses, where children's responses were coded as correct or not correct. However, the overall percentages of children who responded with "don't know" were also of interest. Only small percentages of children actually answered, "I don't know/I don't remember" when asked questions about past placements and visits to court. When asked what their age was, and season when they had changed placement or visited court, for instance, the percentages of "don't know" responses ranged from 0% (e.g., age at first and most recent court visit) to 11% (e.g., season of their first court visit). Of importance, these percentages were fairly evenly distributed across age (small *N*s in some cells, though, precluded us from testing statistically for age differences in "don't know" responses). The percentages of children who said "I don't know" when asked about what month their prior placement changes and court visits had occurred were slightly higher, ranging from 12% (month of last placement) to 25% (month of first court visit). Again, though, the percentages did not differ between the younger and older children (χ^2s $\leq .20$, *p*s $\geq .65$).

Current Temporal Location Knowledge

The dichotomous accuracy scores for children's answers to the current knowledge questions, and the discrepancy scores for children's answers to the month and season questions, are presented in Table 2. As is evident, virtually all children were correct in stating their age, whereas considerably fewer were accurate in response to the other current temporal understanding questions, especially season.

To test for age-related changes in children's current temporal knowledge, their accuracy scores (1 = *correct*, 0 = *not correct*) were subjected to logistic regressions with age (in years) entered as the predictor. The models predicting children's reports of the day and month of their birthday were significant, *Wald* $\chi^2(1, N = 167) = 12.50, p < .001$, and *Wald* $\chi^2(1, N = 167) = 8.92, p = .003$, respectively. As expected, with age, children were incrementally better at reporting both the day and month of their birthday (see Table 2). Consistent age-related improvements also emerged in children's responses to questions about the current month, *Wald* $\chi^2(1, N = 166) = 31.43, p < .001$. The model testing age-related differences in children's accuracy for the current season was nonsignificant, with poor performance across age.

Next, we correlated children's age and their discrepancy scores for month and season to identify more subtle age-related changes in children's temporal knowledge. Findings were consistent with the logistic regressions. With age, the discrepancy between the current month and the children's reports decreased, $r(139) = -.295, p < .001$, but the association between age and season discrepancy scores was nonsignificant.

Temporal Location Information for Past Events

The primary purpose of the present study was to determine how well maltreated children were able to recount temporal information about repeated salient

Table 1
Sample Demographics

	Court sample	Placement sample	Total sample
N	85	82	167
Current age in years	8.04 (*SD* = 1.41)	8.02 (*SD* = 1.39)	8.03 (*SD* = 1.40)
Percent female	50.6	51.2	50.9
Age at first experience	6.49 (*SD* = 1.57)	6.08 (*SD* = 1.56)	
Range (in years)	3 to 10*	4 to 10	
Delay between first experience and current time (in days)	707.63 (*SD* = 579.79)	841.61 (*SD* = 613.74)	
Range (in days)	8 to 2,386	28 to 2,242	

Note. *One child was brought to court the first time at age 3 years, 9 months; all other children were between the ages of 4 and 10 years at the time of their first visit.

Table 2
Percent Correct and Average Discrepancy Scores (SDs) for Children's Current Temporal Knowledge

	Age in years				
	6	7	8	9	10
N	31	33	36	34	33
Current Age	96.77	93.94	97.22	94.12	100.00
Birthday Day**	58.06	63.64	80.56	85.29	90.91
Birthday Month*	64.52	84.85	94.44	88.24	93.94
Current Month**	29.03	75.00	72.22	91.18	100.00
Month Discrepancy**	0.74	0.17	0.20	0.01	0.0
(*SD*)	(1.30)	(0.79)	(0.53)	(0.02)	(0.0)
Current Season	61.29	39.39	47.22	35.29	48.48
Season Discrepancy	0.19	0.26	0.29	0.36	0.21
(*SD*)	(0.36)	(0.36)	(0.44)	(0.42)	(0.38)

Note. Age-related changes were examined via logistic regressions for the percent accurate questions and correlations for the discrepancy scores (reported in corresponding units). Significant age differences are noted. Discrepancy scores by age for month and season are reported here for illustrative purposes.
* $p < .01$. ** $p < .001$.

prior experiences: placement changes and court visits. We analyzed children's responses to the two events separately, and we note where similar trends emerged. Children's age was entered as a dichotomous variable (older vs. younger children), using a median split to determine how age affected children's temporal understanding.

Placement. First, children's responses to temporal questions about their last (most recent) placement were examined. This change had occurred on average 1.49 years before the interview. Overall, 54% of children correctly reported their age, 8% correctly reported the month, and 32% correctly reported the season. Children were on average about 2/5 of a year off for age (159 days), 2 months (62 days) off for month, and about 1/2 of a season (47 days) off for season (see Table 3).

Chi-square analyses, comparing the dichotomous accuracy scores between younger and older children, failed to reveal any significant age differences in the number of children who were correct in their answers (χ^2s $\leq$ 2.16, *p*s $\geq$ .14). Next, linear regressions were conducted predicting children's discrepancy scores (age, month, and season at the time of their most recent change in placement). Predictors included children's age (younger vs. older) and delay between the last placement and interview. Only one regression was significant, specifically that predicting the discrepancy in children's reported age at the time of their most recent placement change, $F(2, 38) = 4.01$, $p = .026$. Delay, but not age, was significant, $B = .37$, $p = .019$: With increasing delay, children became more discrepant, as would be expected.

In subsequent analyses, we evaluated whether the number of children who correctly reported the month and season when they were last removed was greater than the number expected by chance. Binomial analyses, conducted separately for the younger and older children, revealed no significant effects (*p*s $\geq$ .078), although a trend emerged for the older children regarding the season of their most

Table 3
Percent Correct and Average Discrepancy Scores (SDs) for Children's Temporal Memory for Placement in Foster Care

	Age		
	Younger children	Older children	Total
N	11–23	19–32	30–55
Most Recent Placement in Foster Care			
Age Percent Correct	50.00	56.00	53.66
Age Discrepancy	0.21	0.58	0.44
(*SD*)	(0.59)	(0.97)	(0.86)
Month Percent Correct	0.00	12.50	7.50
Month Discrepancy	2.64	1.74	2.07
(*SD*)	(2.12)	(1.78)	(1.93)
Season Percent Correct	25.00	36.00	31.71
Season Discrepancy	0.62	0.46	0.53
(*SD*)	(0.50)	(0.46)	(0.48)
First Placement in Foster Care			
Age Percent Correct	45.83	39.39	42.11
Age Discrepancy	0.53	0.70	0.62
(*SD*)	(0.86)	(1.18)	(1.05)
Month Percent Correct	12.50	3.03	7.02
Month Discrepancy	2.77	2.75	2.76
(*SD*)	(1.82)	(1.47)	(1.60)
Season Percent Correct	33.33	21.21	26.32
Season Discrepancy	0.48	0.56	0.53
(*SD*)	(0.56)	(0.53)	(0.54)

Note. Age-related changes were examined via logistic regression for percent correct and regression in conjunction with delay for discrepancy scores (reported in corresponding units); none was significant.

recent placement experience, $p = .078$. Thirty-six percent (9/25) of the children stated the correct season.

Next, we repeated these analyses, but in relation to children's reports of their first rather than most recent change in placement. Children's first placement occurred on average 2.3 years before the interview. Across questions, few children were accurate: 42% correctly stated their age, 7% correctly stated the month, and 26% correctly stated the season. Children were about 3/5 of a year off in their age (227 days), about 2 3/4 months (83 days) off for month, and about 1/2 season (47 days) off for season (see Table 3). The dichotomous accuracy scores were unrelated to children's age according to chi-square analyses (χ^2s ≤ 1.91, *p*s $\geq .17$). Nor did the discrepancy scores significantly decrease with age, although one of the regressions, namely that predicting the discrepancy in children's reported age at the time of their first placement and their actual age, was significant, $F(2, 47) = 7.89$, $p = .001$. As was evident for children's last placement, as the delay increased, the discrepancy in children's reported age at first placement also increased, $B = .52$, $p < .001$.

Finally, children's accuracy in reporting the month and season of their first placement was compared to chance via binomial analysis. As expected, given children's poor performance when asked about their most recent placement, the number of children who answered correctly did not significantly differ from chance for either age group (ps $\geq$ .11).

Court visits. Next, we examined children's temporal memory for prior visits to court, a less distressing but nonetheless salient and eventful experience for many children. The delay between children's last court visit and the interview was .47 (half) a year and did not vary with age. When asked when this event occurred, 59% of the children correctly reported their age, 11% correctly reported the month, and 21% correctly reported the season. According to the discrepancy scores, children were on average about a quarter of a year off in reporting their age (87 days), about 2 1/3 months (71 days) off in reporting the month, and about 1/2 a season (51 days) off in reporting the season of their most recent court visit (see Table 4).

When chi squared analyses were conducted predicting children's dichotomous accuracy for their reported age, the month, and the season of their first court visit, the percentage of younger and older children who correctly reported month significantly differed, $\chi^2(1, N = 65) = 6.72$, $p = .01$. None of the younger children correctly reported the month of their most recent visit, whereas 20% of the older children were correct. When linear regressions were conducted predicting children's discrepancy scores from their age (younger v. older) and delay between the most recent court visit and interview, none of the models was significant (Fs $\leq$ 1.06, ps $\geq$ .36). Finally, when the percent of children accurately reporting the month and season were compared to chance via binomials, the older children performed significantly better than would be expected by chance in reporting the month of their last court visit, $p = .016$: 20% (7/35) were correct.

Children's first visit to court had taken place, on average, 1.72 years prior to the interview date. Fifty-two percent correctly stated their age, whereas 9% correctly stated the month, and 34% correctly reported the season. Children were on average about 3/5 a year off in age (215 days), about 2 months (63 days) off for month, and just under 1/2 a season (41 days) off for season (see Table 4).

No significant age-related improvements emerged in chi-square analyses predicting children's dichotomous accuracy scores or regressions predicting children's discrepancy scores for the month and the season of their first court visit. However, the model was significant for children's age discrepancy scores, $F(2, 46) = 28.18$, $p <$ .001: Longer delays predicted larger discrepancies, $B = .76$, $p < .001$.

Additional analyses, however, suggested that at least the older children were not entirely random in their responses. When children's accuracy for month and season were compared to chance via binomials, the percent of older children reporting the season of their first court visit (42% or 14/33 children) was significantly better than one would expect by chance, $p = .013$.

Links Between Children's Current Temporal Knowledge and Temporal Memory for Prior Events

In legal settings, one reason to ask about children's understanding of current time scales is to demonstrate that they can accurately report temporal information. The assumption is that children who are better able to describe current temporal information are similarly better at reporting temporal information about past events. We tested this assumption directly to determine whether less discrepant

Table 4
Percent Correct and Average Discrepancy Scores (SDs) for Children's Temporal Memory for Court Visits

	Age		
	Younger children	Older children	Total
N	15–30	26–36	41–66
Most Recent Visit to Court			
Age Percent Correct	63.33	52.78	57.58
Age Discrepancy	0.10	0.35	0.24
(*SD*)	(0.25)	(0.65)	(0.52)
Month Percent Correct*	0.00	20.00	10.77
Month Discrepancy	3.07	1.87	2.35
(*SD*)	(2.04)	(1.94)	(2.05)
Season Percent Correct	20.00	22.22	21.21
Season Discrepancy	0.60	0.53	0.56
(*SD*)	(0.54)	(0.53)	(0.54)
First Visit to Court			
Age Percent Correct	65.38	40.63	51.72
Age Discrepancy	0.21	0.90	0.59
(*SD*)	(0.43)	(1.25)	(1.03)
Month Percent Correct	3.85	12.12	8.47
Month Discrepancy	2.40	1.92	2.10
(*SD*)	(1.94)	(2.12)	(2.05)
Season Percent Correct	23.08	42.42	33.90
Season Discrepancy	0.44	0.47	0.45
(*SD*)	(0.46)	(0.59)	(0.53)

Note. Age-related changes were examined via logistic regression for percent correct and regression in conjunction with delay for discrepancy scores (reported in corresponding units); significant age differences are noted.
* $p < .01$.

responses to current temporal information predicted less discrepant responses about prior placements and court visits.

We specifically correlated children's discrepancy scores for birthday day and month with their discrepancy scores regarding their age for the past events, and their discrepancy scores for current month and season with their discrepancy scores for the month and season of their first and last placements and court visit. Children's current age and the delay between the interview and the relevant past event were covaried. Only one significant association emerged. Unexpectedly, larger discrepancies in children's accuracy in reporting the current season were related to *smaller* discrepancy scores in reporting the season of their last court visit, $r(41) = -.348$, $p = .02$. However, given the number of correlations conducted, we hesitate to place considerable weight on this finding. Instead, children's current temporal knowledge was, for the most part, not predictive of their ability to describe the temporal location of prior events.

Children's Nontemporal Memory of the Prior Events and Temporal Memory Accuracy

The results thus far suggest children have poor memory for the temporal information of prior court visits and placements in foster care. It is not clear, however, whether their poor performance was specific to deficits in temporal memory or knowledge or due to generally poor memory for the entire experience. In other words, perhaps children performed so poorly when answering the temporal questions simply because they failed to remember the prior experiences altogether. Because we had asked children in the placement sample questions about nontemporal details, such as with whom they lived, we were able to identify children who did versus did not provided nontemporal information. By comparing temporal details between these groups, we could evaluate whether general memory failure contributed to children's poor temporal memory. Two sets of findings, however, suggest that this did not occur, allowing us to say with greater confidence that children's lack of temporal memory is not simply a function of a broader inability to remember the prior experiences.

First, the vast majority of children provided at least some nontemporal information (which included where or with whom they lived) for both last and first placement: 88% of children (53/60) did so when asked about their most recent placement, and 90% of children (60/67) did so when asked about their first placement. Thus, most children appeared to remember their placements. The accuracy of much of the information that children provided could not be determined (e.g., they provided a nick-name for a caretaker, or gave a physical description of the home in which they lived), although 44% of the children reported verifiable details about their last placement, and 27% reported verifiable details about their first placement.

The numbers of children who recalled nothing were too small to compare to children who reported some information (verifiable or not). However, we were able to compare children who provided verifiable information to children who provided nonverifiable information (excluding the children who provided no information). No significant differences emerged, all Fs $\leq .66$, ps $\geq .42$. The fact that there are no differences between the groups suggests one of two things. If the children who recall nonverifiable information are *not* accurately recalling their experience, this suggests memory doesn't drive temporal performance, because the verifiable children aren't outperforming the nonverifiable children. If the nonverifiable group *are* accurately recalling their experience, then this suggests that the poor performance overall is not due to lacking memory, because almost all of the children recalled information (either verifiable or nonverifiable). In either case, there is no evidence that children's poor memory explained their poor temporal estimation for placement experiences.

Children's Numerosity Judgments

Finally, we examined children's ability to report numerosity information about placements and court visits. Three children provided extreme responses (two children, ages 6 and 9, respectively, claimed that they had been to court "50" and "100" times and one child, age 10, stated that she had lived in "25" placements) and were excluded. Because the patterns of responses across the two prior experiences were highly similar, they are reported concurrently.

On average, children experienced 3.02 (SD = 2.09) placements after age 3 in foster care and 3.21 (SD = 2.57) prior court visits. Younger children experienced slightly fewer placements than did older children, Ms = 2.59 and = 3.42, respectively, $t(72.1) = 1.86$, $p = .067$, and had been to court significantly less often, *M*s = 2.30 and 4.28, respectively, $t(71.34) = 3.74$, $p < .001$.

We first examined age differences in children's dichotomous accuracy, that is, their ability to state the precise number of prior placements and court visits and to answer yes or no regarding whether they had experienced more than one, more than five, and more than 10 prior placements/court visits. Results revealed extremely poor performance (see Table 5). However, correlational analyses between children's actual number of experiences and reported number of experiences were significant for both placement and court experiences, $r(79) = .44$, $p < .001$ and $r(71) = .29$, $p = .009$, respectively, indicating that children had some general sense of event frequency. Age differences in accuracy only emerged when children were asked whether they had experienced more than 10 court visits, $\chi^2(1, N = 85) = 5.47$, $p = .019$: 85% (34/39) of older children responded accurately, whereas 65.2% (30/46) of the younger children did so.

Next, we divided children into two groups: (a) children who had zero to two prior placement experiences ($N = 40$) or court visits ($N = 44$), and (b) children who had three or more placements experiences ($N = 42$) or court visits ($N = 41$). We then conducted logistic regressions predicting children's accuracy to the "more than" questions from whether children were in lower and higher frequency

Table 5
Children's Accuracy in Reporting Frequency of Placements or Court Visits

	Age		
Event	Younger children	Older children	Total
Placements in Foster Care			
N	29–39	38–43	68–82
Children's Reported # Placements (range)	2.96 (1–11)	3 (0–10)	2 (0–11)
Actual # Placements (range)	2.59 (1–8)	3.42 (0–12)	3.02 (0–12)
Discrepancy: Number of Placements	1.33	2.26	1.83
% Correct–Exact Number of Placements	27.27	20.51	23.61
% Correct–More than 1 Placement	66.67	67.44	67.07
% Correct–More than 5 Placements	64.10	66.67	65.43
% Correct–More than 10 Placements	76.92	90.24	83.75
Visits to Court			
N	44–46	35–39	79–85
Children's Reported # Times to Court (range)	4.39 (0–20)	3.91 (1–14)	4.18 (0–20)
Actual # Times to Court (range)	2.30 (0–10)	4.28 (0–10)	3.21 (0–10)
Discrepancy: Number of Times to Court	2.86	2.46	2.68
% Correct–Exact Number of Times to Court	13.33	13.89	13.58
% Correct–More than 1 Time	58.70	66.67	62.35
% Correct–More than 5 Times	58.70	58.97	58.82
% Correct–More than 10 Times*	65.22	87.18	75.29

Note. Age differences were examined via chi squared analyses for dichotomous accuracy scores and via linear regressions in conjunction with delay for discrepancies scores; significant age differences noted.
* $p < .05$.

groups and whether children were younger or older. When asked whether children had more than one prior experience, children's accuracy significantly differed by the number of prior experiences for both the placement and court samples, *Wald* $\chi^2(1, N = 82) = 6.38$, $p = .012$ and *Wald* $\chi^2(1, N = 85) = 9.67$, $p = .002$, respectively. Children with more than two prior placements or court visits were significantly more accurate than children with two or fewer experiences (80.5% v. 53.7% for the placement sample and 80.5% v. 45.5% for the court sample). For the question of whether they had more than five prior experiences, the opposite pattern emerged: children with more than two prior court visits were *less* accurate (46.3% v. 70.5%) when responding to whether they had more than five prior court visits *Wald* $\chi^2(1, N = 85) = 5.57$, $p = .018$, and a trend emerged in the same direction for the placement sample (56.1% v. 75.0%), *Wald* $\chi^2(1, N = 82) = 3.23$, $p = .072$. Children's accuracy did not differ by the number of prior experiences for the question of whether they had more than 10 prior experiences, though age effects emerged for the court sample, consistent with the findings reported above. Thus, children appeared to be making some inferences about numerosity—they performed better when the actual number of experiences was further from the estimated value about which they were asked (i.e., once, five or 10 times)—and hence demonstrated some ability to reason about highly improbable, extreme values.

Next, we examined children's discrepancy scores (i.e., the difference between the number of placements and court visits reported by the child and the actual number; see Table 5). Neither age nor delay significantly predicted the discrepancy scores, per linear regressions (*F*s $\leq$ 1.97, *p*s $\geq$ .15). We then compared children's accuracy scores for the "more than" questions to chance (50%, assuming children were randomly responding yes/no) via binomial analyses. Trends emerged for younger children when stating whether they had been to court more than once ($p = .059$) and for both younger and older children when stating whether they had been to court more than five times (*p*s = .059 and .068, respectively). For the other questions, including the placement questions, both younger and older children performed significantly above chance (*p*s $\leq$ .014). Thus, although children's numerosity abilities were quite limited, children were not entirely random in their answers, and again, especially the older children, showed some sense of highly improbable numbers.

Discussion

The purpose of this study was to advance understanding of maltreated children's developing ability to recall the temporal location and numerosity of salient repeated occurrences, namely changes in placement and visits to dependency court. Maltreated children's knowledge about forensically relevant events is critically important in investigative interviews and in court. This study was unique in several respects. Unlike the only other study to examine a maltreated sample (Orbach & Lamb, 2007), the accuracy of the children's responses could be assessed. Unlike most laboratory studies examining children's temporal judgments, the events were remote, were personally significant, and were repeated over long periods of time.

Overall, even the oldest maltreated children had considerable difficulty providing precise temporal details about these prior experiences. When performance was compared to chance, the older children evinced some rudimentary knowledge about the events' likely timing. About one half of children could identity their age for the first or last placement or court visit. Their estimates tended to be 9 to 12 months off for placements and 6 months off for court visits. Only about 10% of children could identify the exact month of any of the events, and children's estimates tended to be off about 2 months. Older children performed above chance when recalling the month of their most recent court visit, again suggesting some limited ability. With respect to season, children were correct about 1/3 of the time, and they were about 50 days off (which is roughly 1/2 of one season). Older children were above chance for the season of their first court visit, though, evincing limited understanding. Children were also poor in recalling the numerosity of their placements or court visits, and erred about 35% of the time even when asked whether the event had occurred once or more than once. Numerosity judgments generally did not improve with age, though they were related to the number of prior events experienced. We found little evidence that children's difficulty was related to their knowledge of current time or their ability to recall the prior events. Delay was related to children's ability to recall their age, but not the month or season. Finally, children did not appear to be aware of their own inabilities; there were remarkably few "I don't know" answers, except with respect to age.

Children had more difficulty than one might have expected based on prior research. Unlike the 7- to 10-year-olds in Bauer et al. (2007), who were 90% accurate in identifying their age at the time of prior events, accuracy of the children in our sample hovered around 50%. Similarly, the 8- to 12-year-olds in Friedman et al.'s (2011) study diverged less in their year estimates for prior events than the children in our study of comparable age. Furthermore, although children's knowledge of current temporal location did not predict better judgments, it is remarkable that a substantial percentage (35%) of the 6-year-olds in our study did not know their birthday month, and that most children did not know the current month until age 7. Prior research has found that children tend to be aware of their birthday month by 4 and the current month by 6 (Friedman, 1992).

The differences in performance of children in our study and children in other studies may be due to several factors. In prior research using life events, the events were parent-nominated (Bauer et al., 2007; Friedman et al., 2011), whereas in our study the events were experimenter-nominated. Events may differ in the extent to which they were the subject of extensive parent–child conversation, including reminders of temporal information about the events, and parent–child conversation is likely to affect children's accuracy (Nelson & Fivush, 2004). Moreover, in prior research, children's accuracies were assessed by comparing their judgment to their parent's (Bauer et al., 2007; Friedman et al., 2011). Hence, if children acquired their temporal knowledge from their parents, discrepancies would be reduced.

Children's judgments may also have been hampered by their maltreatment status, which most often includes neglect and is associated with low socioeconomic status, disruptions in education, and verbal delays (Kendall-Tackett & Eckenrode, 1996; Myers et al., 2002; Veltman & Browne, 2001). These limitations likely extend to the domain of knowledge of temporal conventions. Without adequate instructions and feedback from others, maltreated children may learn such conventions later than nonmaltreated children. Although knowledge of current temporal location was largely unrelated to children's temporal memory for past events, Friedman et al. (2011) found that children's understanding of the cyclical nature of conventional temporal scales was predictive of their temporal accuracy. It would not be surprising if maltreated children have poorer understanding of these cycles.

It is also possible that children's judgments are better if they are provided with visual aids. In Bauer et al. (2007), children were given pictures of themselves at different ages and line drawings of seasons, annual events, and holidays; however, no aids were provided in Friedman et al. (2011). In prior research Friedman and colleagues have shown that children are adept at sequencing events on a physical timeline (Friedman, 2003; Friedman & Kemp, 1998), and by second grade children's performance may be improved by the provision of visual anchors representing routine annual events (Strube & Weber, 1988).

Another distinction is that in prior research, the experimenters ensured that the events were unique (Bauer et al., 2007; Friedman et al., 2011). In our study the events were almost always repeated. Although we have stressed the fact that better memory for an event does not guarantee better temporal estimation, repetition may affect memory in such a way as to make temporal judgments more difficult. Repetition is likely to strengthen children's memory for routine aspects of the events but increase confusion among individual events (Roberts, 2002; Roberts & Powell, 2001).

These possible explanations for the different findings suggest topics for future research. Are children's temporal judgments more accurate for unique than for repeated events? Can children's judgments about remote events be improved through interviewing aids? Do parent–child conversations about prior events include temporal information? How do maltreated and nonmaltreated children's temporal judgments differ?

Policy Implications

Our results suggest caution in attempting to elicit temporal location information from children about abuse. Abuse is likely to be repeated over long periods of time, and children routinely delay disclosing, which means that when they do disclose, the initial abuse is quite remote (Malloy, Lyon, & Quas, 2007). Other aspects of abuse that may affect children's ability to provide temporal estimates are less well understood. It seems unlikely that perpetrators—who are often the only other eyewitness to abuse—will discuss with the child the dates of abuse or contextual information that would make inferences about dating possible. It is unknown whether abuse tends to be temporally routinized (e.g., every weekend), which would affect children's ability to provide reasonable numerosity estimates. We tentatively view children's performance on the tasks in this study (as well as in prior research) as presenting an optimistic portrayal of how well one might expect abused children to date their abuse.

From a practical perspective, although it may be unrealistic to assume that children will be able to provide temporal estimates of abuse, it may be possible for adults to estimate dates based on what children can recall about abuse. The NICHD interview protocol for questioning children about abuse emphasizes the use of open-ended rapport-building and questioning, and is successful in eliciting large numbers of contextual details, such as where the abuse occurred and concurrent events (Lamb, Hershkowitz, Orbach, & Esplin, 2008). These details, in turn, can be used by adults to estimate the dates of abuse, for example, by determining when the child lived in various locations (Lyon & Saywitz, 2006), or when various family members lived in the child's home. With respect to numerosity, successful recall of individual episodes of abuse can generate conservative estimates of the number. The NICHD protocol recommends asking children about the first and last episodes of abuse, which are likely to be particularly memorable (Lamb et al., 2008), and follow-up questioning can inquire into other episodes that may be remembered because of their distinctive characteristics (e.g., the "worst" or "a different" episode). Obviously, if a child recalls a first time, a last time, and a different time, then abuse occurred at least three times. However, our finding that children are less than perfect in assessing whether they had previously been to court or experienced removal once or more than once suggests caution in using the NICHD protocol's recommendation that children be asked whether the abuse occurred "one time or more than one time" (Lamb et al., 2008, p. 292). Furthermore, it is an open question whether repeated abuse and youthfulness renders some children incapable of recalling individual episodes with any precision.

Although there is clearly need for more research, the results have implications for how sexual abuse is charged in the courts. Because the law tends to require only so much information about the charged crime as the prosecution can reasonably provide, children's difficulties in providing accurate temporal estimates and their failure to register their uncertainty (as demonstrated by the infrequent "I don't know" response) counsels against insistent questioning of child victims about time and number. If prosecutors feel compelled to rely on children's estimates of temporal location and numerosity, indictments and other charging instruments should be written to allow for greater uncertainty. For example, it is probably unrealistic to charge a 1-year window based on a young child's age estimate, at least without further contextual information corroborating the estimate.

The results also have implications for efforts to reform child abuse crimes. Children's difficulty in recalling temporal information about specific abuse incidents, or worse, their inability to recall specific incidents at all, has led to various types of reform. Some jurisdictions in the United States and Australia have created crimes of continuous or persistent sexual abuse, so that a single count can charge multiple acts of abuse (National District Attorney's Association, 2010; Queensland Law Reform Commission, 2000). However, many continuous sexual abuse statutes do not eliminate the need for some specificity with respect to number and time. For example, of the nine states in the U.S. that have continuous sexual abuse crimes, eight require that three or more acts of abuse occurred, and seven specify a minimum range of time over which the abuse must have occurred (typically three months; NDAA, 2010). Hence, the police and prosecutors will still be inclined to ask children for specifics about time and number. A statute that requires "multiple acts" occurring over a "period of time" would better accommodate children's abilities. The charging instrument would still need to specify a range of time over which the abuse occurred, but minimum number and time requirements would not apply.

As charges become less specific, however, the courts are more likely to raise concerns of unfairness. For example, the Australian Supreme Court held that although specific dates need not be provided for multiple acts charged under a continuous sexual abuse statute, it was insufficient for the jury to simply agree that abuse had occurred on more than one occasion; rather the jury had to agree about which specific acts occurred (KBT v The Queen, 1997; see also State v. Rabago, 2003 [Hawaii]). Although the laws may be rewritten to specify the type of juror unanimity required (Australian Law Reform Commission, 2010), this may be difficult: commentators sometimes doubt the fairness of such a move (Queensland Law Reform Commission, 2000), and in some jurisdictions change may require constitutional amendment (Hawaii Constitution, 2011). At any rate, prosecutors are sometimes reluctant to charge under such statutes (Lewis, 2006; Sandquist, 1994), because multiple counts of individual sex crimes may increase the possible sentence or encourage plea bargaining.

Other jurisdictions, such as the U.K. and New Zealand, allow specimen (or representative) counts, in which the prosecution seeks to prove that the defendant committed at least one act during a specified temporal interval (Lewis, 2006; Judicial Studies Board, 2010). Specimen counts reduce the difficulties of eliciting numerosity information from child witnesses, because the child can testify to a specific act and confirm that that type of act happened multiple times, or testify to a course of conduct. The prosecution is still expected to specify a temporal range, but this range is naturally extended because of the repeated nature of the abuse. Some difficulties with continuous sexual abuse crimes still arise, however, with respect to specimen counts. In the U.K., the courts have held that defendants cannot fairly be sentenced for multiple acts based on a single specimen count. Prosecutors are likely to narrow the temporal range in order to charge multiple specimen counts (e.g., charging one specimen count for each year), which may necessitate eliciting age estimates from the child (Judicial Studies Board, 2010).

In closing, these findings have important implications for understanding children's ability to provide temporal location or numerosity information about significant and repeated life events. Legal assumptions often (and at times grossly) overestimate children's competencies. Children who have accurate memories of significant, prior experiences are nevertheless quite likely to provide inaccurate answers to questions about time and number, and conversely, inaccurate responses to time and number questions may say little about whether the event actually occurred. A better picture of children's capabilities and limitations in estimating time and number can lead to fairer adjudication of child witnesses' claims.

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