Children's Understanding of Time of Day Through Time-Place Learning

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Introduction

Psychologists have previously studied children's ability to discern or describe the current time of day.

Previous research relied heavily on children's knowledge of time words, which confounded children's understanding of time of day with their level of vocabulary development (Ames, 1946; Bradley, 1947; Oakden & Sturt, 1922).

Time-Place-Learning (TPL) research investigates the ability of non-human animals to learn the location of a resource when its location varies according to time.

There are three types of TPL (Carr & Wilkie, 1997):

- Circadian: location of the reward varies depending on time of day
- Interval: spatial location of a reward varies depending on the time since some external event
- Ordinal: do not learn timing of occurrences but rather the order in which they occur within a particular time frame

Can children incorporate time-of-day information in a non-verbal TPL task?

Research Question

Are children are able to demonstrate time-of-day understanding when a non-verbal TPL protocol is implemented?

Method

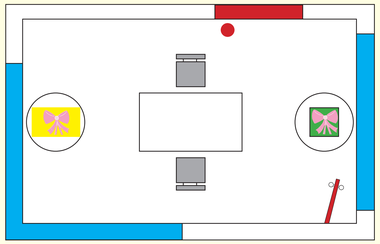
Participants

- A total of 38 4-year-olds from 6 different daycares in St. John's, NL, Canada participated (20 boys and 18 girls).Nine children were eliminated because they completed less than 38 morning and afternoon trials. One more child was eliminated because they were not interviewed. Of the 10 children who were eliminated, 7 were girls.

Procedure

- Children were randomly assigned to one of two test groups

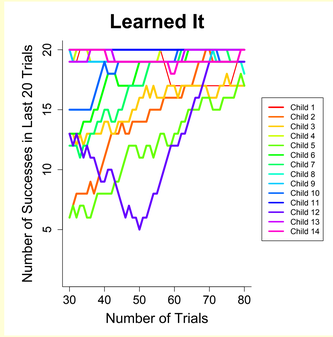
Explicit Group	Implicit Group
Was told:	**Was told:**
"there is a toy in one of the boxes and it will be in one box in the morning and the other box in the afternoon"	**"there is a toy in one of the boxes and it is sometimes in one box and sometimes in the other"**

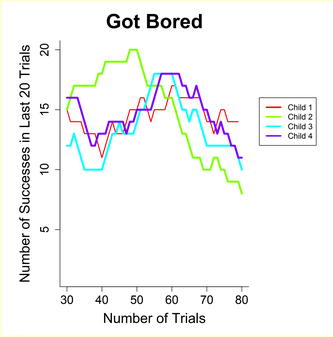


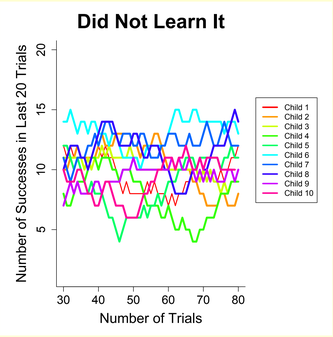
Testing Room

- Used two boxes, one contained a toy and the other remained empty
- The toy was in one location in the morning and the other location in the afternoon
- For the first week, the researcher shook each box and then asked the child to chose which box the toy was in
- For the test trials, the child was asked to go to whatever location they thought the toy was in during each testing session

Results







	Condition		
Type of Timer	**Explicit**	**Implicit**	**Total**
Indeterminate	3	1	4
Circadian	6	7	13
Interval	0	0	0
Ordinal	1	0	1
Total	10	8	18

$X^2(2) = 1.878$, $p = .391$

	Condition		
TOD Achievement Group	**Explicit**	**Implicit**	**Total**
Learned It	9	5	14
Got Bored	1	3	4
Did Not Learn It	6	4	10
Total	16	12	28

$X^2(2) = 2.013$, $p = .366$

	Gender		
TOD Achievement Group	**Boy**	**Girl**	**Total**
Learned It	11	3	14
Got Bored	2	2	4
Did Not Learn It	4	6	10
Total	17	11	28

$X^2(2) = 3.863$, $p = .145$

	Is is morning or afternoon right now?		
TOD Achievement Group	**Wrong**	**Right**	**Total**
Learned It	2	12	14
Got Bored	0	4	4
Did Not Learn It	4	6	10
Total	17	11	28

$X^2(2) = 3.564$, $p = .168$

Discussion & Conclusion

- A little more than half of the four-year-olds were able to learn a Time-Place-Learning task based on time of day.
- There is a trend for boys to have a higher learning rate than girls on this task, but the difference is not significant.
- Surprisingly, explicit verbal instruction does not appear to help the learning of this task.
- Being able to verbally report if it is morning or afternoon is likely related to, but not the same as, the ability to learn this task. The fact that there were 2 children who were able to learn the task but were unable to correctly state if it was currently morning or afternoon suggests that Time of Day knowledge can be implicitly incorporated by children in learning tasks.

Acknowledgements

This research was supported by the Natural Sciences and Engineering Research Council of Canada (NSERC) to CT and DH. We would like to thank Sarah Clarke, Christina Hodder, Abby Kavanagh, Erin Lynch, Kathryn McDonald, Kaylah Parsons, Ashar Pirzada, Ashley Rose, Nicole Shea, Micah Tilley and Meagan White for help with data collection. We would like to give extra thanks to the children that participated in the studies as well as the amazing staff at the Child Care Centres. Direct correspondence to Christina Thorpe (cthorpe@mun.ca).