

# Guessing Chance Events: Children and Adults' Beliefs about the Unknowable and the Unknown.

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## Introduction

In four experiments we investigated children's, adolescents' and adults' preferences about when to make a guess about chance events. Previous research has shown that adults prefer to guess before rather than after an uncertain event has happened, even though the probability of guessing correctly is just the same at both points in time (e.g. Brun & Teigen, 1990; Chow & Sarin, 2002). Heath and Tversky (1991) explain these findings with their 'competence hypothesis': adults feel more confident when they feel competent. In situations where they are ignorant of an outcome that, potentially, someone could know, adults feel less competent than when an outcome is unknowable. They feel less confident, therefore, in situations where an outcome has already been determined. In order to establish when this irrational adult preference first emerges we developed a guessing task similar to those used previously with adults but also suitable for children. However, our experiments unearthed an unexpected difference in responses to live and imagined chance events.

## Experiment 1: Can we replicate previous findings that adults prefer to guess the outcome of a chance event *before* the outcome has been determined?

Adults imagined playing a game in which they had to guess what number would come up on a die. We checked whether adults preferred to guess the number before the die was thrown rather than after the outcome had been determined.

### Participants

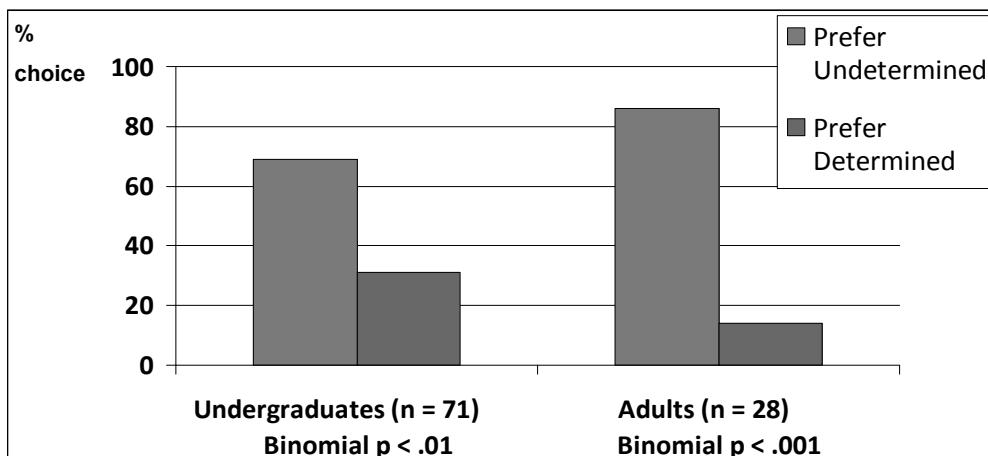
Seventy-one undergraduates (47 female, 24 male; age range = 17;2 to 22;1,  $M = 18;11$ ).

Twenty-eight adults (19 female, 9 male; age range = 35;00 to 57;00,  $M = 48$  years).

### Design

Participants read a description of a dice throwing game illustrated with photographs. They were told to imagine shaking and throwing a die, letting it fall out of sight so nobody could see what number had come up. Participants were asked to imagine guessing the fall of the die. Then they filled in a questionnaire to indicate whether they would prefer to guess before they had thrown the die, or after they had thrown it but before anyone had seen the outcome.

When asked to imagine playing the die game adults prefer to guess *before* the outcome is determined.



## Experiment 2: Do children respond like adults to chance events?

Compared with older children and adults, young children tend to over-estimate their knowledge of uncertain events (e.g. Klahr & Chen, 2003; Beck & Robinson, 2001). However, when presented with the same uncertain event 4- to 6-year-old children are more likely to acknowledge the possibility of alternative outcomes when the outcome is *undetermined* than when the outcome has been *determined* (but is still unknown) (Robinson, Rowley, Beck, Carroll, & Apperly, 2006). If young children feel more confident they know the outcome of an uncertain event after the outcome is determined, they should prefer to guess after the outcome is determined rather than before the event has occurred: *the opposite preference to that seen in adults*.

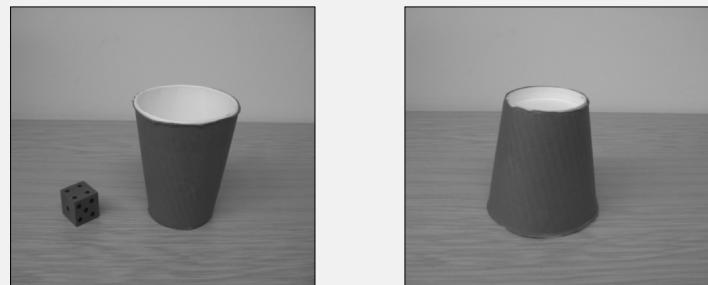
### Participants

Sixty-four 6- to 8-year-olds (32 female, 32 male; age range = 5;5 to 8;6, M = 7 years).

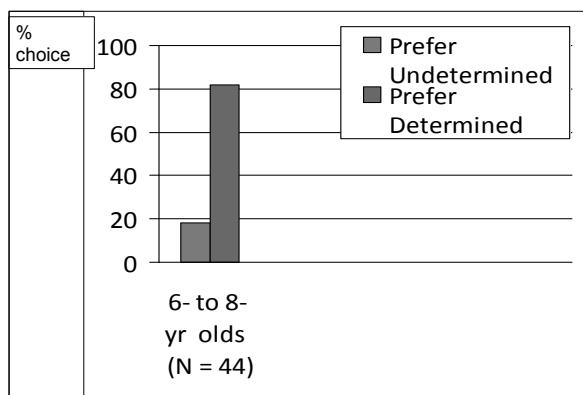
### Design

Each child played two practice games, one *undetermined* (guess then throw) and one *determined* (throw then guess before anyone has seen the number). In each game the child shook the die and then turned over the cup leaving the die unseen. The child was then asked to choose which of the two games they preferred to play. The choice made was the dependent variable.

“What do you want to do?”  
“Guess first then shake?” or “Shake first then Guess?”



When playing a live game of chance 6- to 8-year-old children prefer to guess **after** the outcome is determined.



We excluded children whose guesses were correct on one but not both practice games in case their final preference was influenced by the correct guess.

The remaining children preferred to guess the number that would come up on the die *after* the outcome had been determined Binomial  $p < .001$ .

To check that reducing the sample did not influence our results we also analysed the responses including children who responded correctly on one practice trial ( $N = 64$ ) but the pattern of responses remained the same.

## Experiment 3: Is children's preference influenced by whether they play or someone else plays the game?

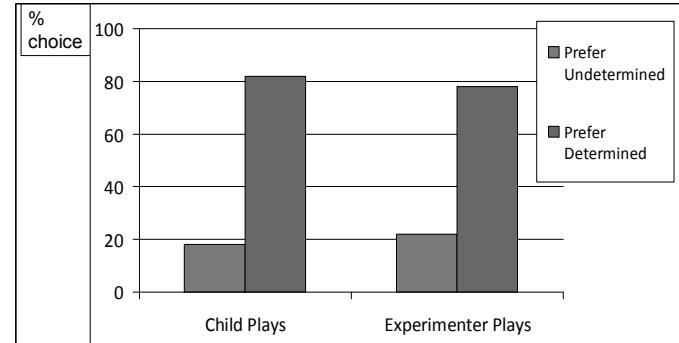
Maybe in Experiment 2 children responded differently to adults because they played the game for themselves rather than imagining how they would feel when someone else played it. We checked this in Experiment 3.

### Participants

Fifty-one 5- to 6-year-olds (27 female, 24 male; age range = 4;8 to 6;2, M = 5;8).

### Design

This time there were two conditions: 'Child plays' and 'Experimenter plays'. Children did not see the outcome of the practice games, which meant that we avoided excluding children who got one of the practice trials correct.



In both conditions children preferred to guess after the outcome had been determined:

Child plays, Binomial  $p < .001$ ;

Experimenter plays, Binomial  $p = .01$ .

When playing or watching someone else play a live game of chance, 5- to 6-year-old children prefer to guess **after** the outcome is determined.

## Experiment 4: For imagined chance events, adolescents and adults prefer to guess *before* the outcome is determined. Do they respond in the same way for live chance events?

In most of the research on adults' decision-making under uncertainty, participants are asked to *imagine* responding to uncertain events. But the theories put forward to explain the results are intended to apply to real-life decision making (e.g. Heath & Tversky, 1991). However, adults may not treat live and imagined events in the same way.

In Experiment 4 two groups of High School students took part in a *live* version of the die throwing game and were asked to state their guessing preference.

### Participants

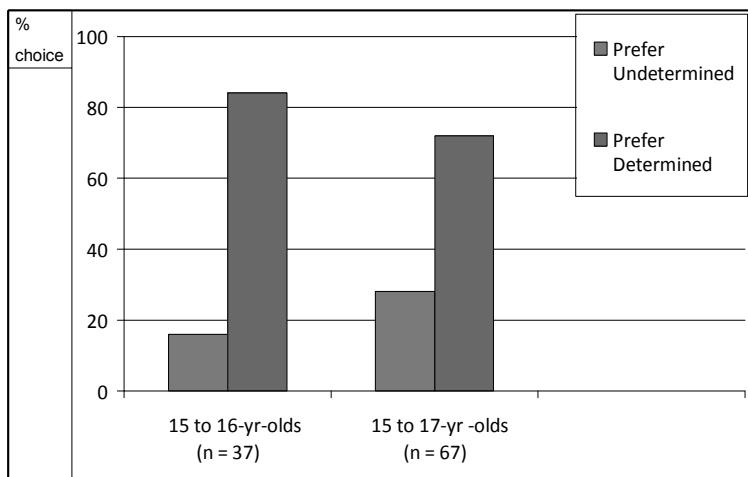
Group 1: Forty-six 15- to 16-year-olds (26 female, 20 male; age range 15;0 to 16;0,  $M = 15;3$ ).

Group 2: Ninety-three 15- to 17-year-olds (67 female, 26 male; age range 15;01 to 17;02,  $M = 15;11$ )

### Design

Participants (tested in groups of 20), watched the Experimenter demonstrate the die throwing task. For each practice game, participants wrote down their guess then found out whether or not it was correct. Participants then chose which of the two games they preferred to play for their final game.

When playing a live game of chance 15- to 17-year-olds prefer to guess *after* the outcome is determined.



As in Experiment 2, we excluded participants whose guesses were correct on one but not both practice games. The remaining participants preferred to guess *after* the outcome had been determined

15 to 16-year-olds, Binomial  $p < .001$

15 to 17-year-olds, Binomial  $p < .001$

As before, when we analysed the responses of all the participants ( $N = 46$ ;  $N = 93$ ) the pattern of responses remained the same.

A separate small group of adult college students ( $N = 17$ ,  $M = 20+$ ) also preferred to guess after the outcome was determined: Binomial  $p = .006$

### Summary and further questions

#### Summary

- In Experiment 1 we replicated an irrational preference in adults to prefer to guess the outcome of an imagined chance event before the outcome is determined.
- In Experiments 2 and 3 when presented with live versions of the same task, 5- to 8-year-olds showed the opposite preference to guess after.
- Surprisingly, on the live task, 15- to 17-year-olds and adults also preferred to guess after.
- In the live tasks, none of the age groups responded in line with the 'competence hypothesis'.

#### Further questions

- Do judgments about chance events have a different basis to those for imagined situations, where knowledge (and competence) might be relevant?
- Alternatively do adult preferences about imagined events arise out of faulty simulation of how they would feel in a live situation (Gilbert, 2007)?
- Do the similar responses to live chance events seen in children and adults have the same basis?
- Do children respond like adults when they *imagine* chance events or do they prefer to guess after the outcome is determined for live and imagined tasks?

### References

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