IS IT LUCK, IS IT RANDOM OR DOES THE DICE KNOW?

Kathleen Truran, University of South Australia, Australia

A research project with children aged from 7–12 years in South Australia has provided interesting insights into children's understanding of the random behaviour of some random generators (RGs). Evidence of beliefs in animism, the control a RG has over the outcome, and the relationship between luck and the outcome of RGs has provided a different perspective on how children view randomness in probability.

INTRODUCTION

'afortunado en el juego, desgraciado en amores' (Spanish Proverb)

I have, in the past, discussed some outcomes from a study into young children's perceptions about probability related to the behaviour of RGs like dice, spinners and urns. Some of these perceptions were based on beliefs that the outcome of RGs depended on the physical properties of the RGs, previous experiences, and sometimes beliefs which have been ascribed to animism. (K. Truran, 1995). This paper seeks to widen discussion about such perceptions and to consider perceptions of luck relating to probability, in order to widen our knowledge about some types of probabilistic thinking.

My research in this field involved approximately 300 children aged from 7–12 years and asked questions concerning similar RGs with different embodiments. The research was based on whole group tests administered in a normal classroom and individual interviews of a random subset of students one week later. The questions used sought to discover whether there was evidence of transfer of beliefs from one RG to another, or whether perceptions differed depending on the RG being discussed. The findings of the study showed that transfer was not common among most children and limited to dice and spinners with some older children. The findings also indicated that children have a wide range of beliefs about RGs and the interviews teased out some underlying reasons behind their thinking.

None of the questions mentioned luck. However, during interviews luck was frequently mentioned. Responses quoted in this paper do not come from direct questions about luck, but from children's spontaneous comments during interviews. Some examples also come from workshops with adult pre-service teaching students, some of whose perceptions were very similar to those of the children. In this paper I will follow up some of these perceptions which clearly exist. We need to know whether such perceptions are

common, whether luck is an important factor in the acquisition of the concept of randomness and whether children perceive different kinds of luck in different situations.

FRAMEWORK

Language is an area that has not been deeply investigated in relation to young children's perception of probability—how children talk about likelihood and uncertainty and explain possible outcomes which may result from everyday events. Green (1982, 1983) was probably the first to comment on lack of verbal precision when talking about probability concepts. Very often certainty and high probability were equated, as were impossibility and low probability. Pupils freely associated an exactly 50% probability with and indeterminate outcomes. Green also observed that only 44% of pupils aged 15+ could give a word or phrase equivalent to 'even chance'.

These findings are consistent with those Fischbein et *al.* (1991) who claimed that subjects in their study did not have a clear definition of the terms possible, impossible and certain. Children tend to substitute mathematical meanings with subjective explanations; "If an event is rare (according to my experience) it will not occur. On the other hand, if for instance 5 may occur then it should occur to somebody why should it not be myself?" Both Green and Fischbein also report that the concept of a certain event is more difficult to comprehend than that of a possible event. This is surprising and worthy of further investigation.

The research of J. Truran (1985) summarised some questions from clinical interviews about dice and coins with responses to these questions defined according to categories. Evidence that RGs were subject to mental powers, were among the categories defined. In this paper I add to these categories with examples taken from interviews to provide an explanation for the reasons given for each perception. The categories that I have used refer to different perceptions of luck. I do not wish to imply that this list is in anyway complete, but believe that these perceptions need to be investigated so that further evidence for extending these categories can be found. The difference between luck and chance was often clearly perceived as was the view that luck is the result of an individual's particular strategy or physical dexterity when tossing dice or coins (Truran, 1985). There are agreed ways to hold coins before tossing, for example opposite side up to the side you want or spinning the coin in the air to produce the wanted outcome, demonstrating this fact frequently proved difficult, but the belief remained. Luck, it was

explained, is getting the number you want, whereas probability is getting any other number. The dice must be treated nicely or 'it just gives you bad luck' shaking it too hard was warned against, as was throwing it too high. All of these actions changed the outcome.

LUCK IS A FORCE

Some of those interviewed said that they did not believe that luck was randomly dispensed rather it was seen as a great force keeping an eye on the balance of things.

(L.S., M, 10:2) 'Some people are born lucky and others are born unlucky; they have to keep a balance'. The need for a balance was reflected in other comments also.

(A.C., F, 9:6) 'some people are unlucky in some areas and some people are unlucky in other areas which you are lucky in and they're not and they're lucky in areas that you're not. That can happen".

Luck and choosing is on a kind of balance I think. (Teaching student, 1997. pers. comm.)

LUCK IS A COMMODITY

Luck may be seen as something that can be used with some left in reserve, can be gained, lost or passed onto another person.

(R.W, F, 12:9) some people might lose their luck and another person might get it.

(S.M., M, 10:5) So you think your luck changed when I tossed the coin? Yes because I think your luck touched the coin and changed the luck.

(B.J., M, 10:4) 'people are lucky when they play games for the first time, because they often win'. B.J. called this 'first time luck'.

LUCK IS NOT FAIR

Talking with children about dice often leads to discussions about whether or not dice are fair.

(S.A., M. 9:11) Do you think dice are fair? Yes, You aren't choosing what you get. it's equal amounts of luck. [S.A. was later shown a die with different coloured faces in place of numbers]. Well I don't know – I haven't ever played a game with a coloured die but I think that there would be a colour that is easier to get, I guess it's just luck.

(JP., F, 8:4) discussing tossing coins.

J.P. I reckon both are more likely to come up ... there's equal possibilities.
I So why did you pick heads?
JP It's just my lucky ... my lucky side.
I So you think heads are more likely to come up?
JP No I reckon heads are ... and tails are just the same.
I So you think heads and tails have an equal chance of coming up?
JP Yes.
I But heads is your lucky side?
JP Yes I think it is just a lucky fluke.
I What do you mean by fluke?
JP It's kind of half luck and half possibility.

JP is trying to come to terms with this complex idea. The mathematics is clear; both sides of a coin have the same chance, but the strong belief about heads being JP's lucky side overrule this, eventually he decides on a half and half explanation, an equal share between luck and mathematics.

WHAT CAUSES LUCK?

What makes you lucky in these (dice) games?

(R.R., F, 7:8) When you have a lucky necklace on.

(K.R.,F, 8:0) believed that she would be lucky when she tossed a die because there were flowers in the middle of the table.

(J F., F, 12) is talking about how she sees luck related to dice, and says that she knows someone who is lucky, she named a member of her class and then went on: 'She wins all the time. She cheats'. I asked if she was sure and she replied, 'I reckon. I reckon the dice is rigged because the dice always comes up on her numbers, in fact I have even stolen one of her dice to find out'.

All of these children believed in a relationship between luck and dice. J.F. went to extreme lengths to prove that what was seen as luck was caused by cheating. Despite her experiment J.F. could not prove this was the case but nevertheless remained convinced.

ANIMISM

Animism, which may be viewed as a type of 'luck' has already been shown to exist in beliefs about forces governing the outcomes of RGs (Wollring, 1994, Truran,

1995), with God, or the RG (usually a die) itself intervening and controlling the eventual outcome. (A.U., F, 9:2) whispered to the die numbers she wanted. When these numbers did not come up she amended her ‘lucky number’. ... Asked where she thought her lucky numbers came from she replied “God”.

(E.G., M, 11)) God chose people to be good at some things and good at other things and he gave some people really good luck and other people just normal luck.

(W.H., M, 7:4) If I play the game Snakes and Ladders you win one day and you play the same game the next day I don’t think I will win the next day. Because something inside me tells me that I won’t win. You can win more than once but I won’t win two days in a row my luck only lasts two days.

(J.G., M, 12:1) Was asked, if you’re good at something does that mean you’re lucky? He replied, no that’s just like when God was sharing out the luck things he um he ran out of luck and so he didn’t share it out evenly because he can’t make people the same.

One teaching student demonstrated ‘blowing’ on a die to a student in her class. In his study into Animism in young children Wollring (1994) claims that beliefs such as these indicate a stable animistic conception, and characterises this perception as ‘subordinate to an authority that can be appealed to’. In some cases that authority is God. One of the interesting aspects of this study is the age range of the children who have explained their ideas in this way. For example JG is twelve years old and was quite certain that it was God who dispensed luck.

OTHER STUDIES

A study by Watson, Collis and Moritz (1995, pp. 550-556) put two questions specifically related to perceptions of luck to students in Years 3, 6 and 9. The first question used a situation of getting out of the ‘lucky side’ of a bed, the second used numbers associated with winning Tattslotto. In the first question responses ranged from an egocentric perception that events can be influenced by one’s own actions to a perception that a psychological mechanism related to confidence may have some influence over subsequent behaviour; ie. success might follow getting out of bed on a particular side because you believe that this will bring you luck, implying thinking at a level of a spiritual control domain like R.R. and K.R. in my study. In the second question some students indicated a belief in lucky numbers, some believed that winning numbers

are more or less likely to occur depending on the previous result; this belief is sometime described as ‘gambler’s fallacy’ based on a belief for example, that when tossing a coin after a run of heads, tails should be more likely to come up. Perhaps because luck is seen as a force, dispensing heads and tails in some balanced logical order. A strategy of presenting a child with questions that specify the idea of luck may not produce true indications about the way children think.

In their extensive study of the verbal lore of school-children I. and P. Opie (1959) found the term ‘half-belief’ to be a useful one to cover issues of luck and superstition. Their experience suggests that asking children directly about superstitions can result in them only mentioning those things that they do not believe personally ‘and hence can result in a general denigration of folk-lore and traditional customs rather than value laden information’(p. 210). Yost *et al.* (1962) criticised an article by Piaget (1950) on the grounds that, among other things, the method used ‘cannot determine whether the subject is using irrelevant clues such as subjective colour preference’. Their criticism implied that children should be given choices about items used in questioning and that unless this is done the questioning may be invalid.

CONCLUSION

In many areas our society, and that includes children, seem to accept that there are random devices which are genuinely neutral. Captains toss a coin to decide the choice of ends at the beginning of a game. Dice are used for board games and urns are used for lotteries. The concern shown by one of the students about what she believed to be cheating is confirmation of a widely spread view that such devices are genuinely neutral. Many of those interviewed know about, and use these devices to decide outcomes. Nevertheless their perceptions do not imply a belief that these devices are neutral. Many students confidently stated that ‘all faces on a 6 sided die had the same chance [of being thrown]’ then went on to explain the place of luck in the eventual outcome. Some of the quotations here show evidence of an animistic belief in some force, others a belief in a strategy or skill Wollring (1994) states that he views animistic concepts in stochastic situations as intuitive, as part of the intelligent behaviour embedded in the subjective domains of experience. They are primary intuitions which are acquired without instruction. These beliefs are not limited to children interviewed. Some adults also do not

believe in random outcomes. ‘For anyone to believe they are lucky they must be egocentric, they are the exception to the rule’ (Teaching Student, 1996, pers. comm.).

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REFERENCES

Fischbein, E., Nello, M. S., and Marino, M. S. (1991). Factors Affecting Probabilistic Judgements in Children and Adolescents. *Educational Studies in Mathematics, 22,* 523-549.

Green, D. R. (1982). A Survey of Probability Concepts in 3000 Pupils aged 11–16 Years. In Grey, D. R., Holmes, P., Barnett, V.; Constable, G. M. (Eds) (1982) *Proceedings of the First International Conference on Teaching Statistics* (pp. 766–783) Sheffield, UK: Organising Committee of First International Conference on Teaching Statistics

Green, D. R. (1983). School Pupils’ Probability Concepts. *Teaching Statistics,* 5(2), 34-42.

Grouws, D. A. (Ed.) (1992) *Handbook of Research on Mathematics Teaching and Learning* New York: Macmillan.

Opie, I. and Opie, P. (1959). *Lore and Language of Schoolchildren* London: Oxford University Press.

Piaget, J. (1950). Une experience sur la psychologie du hasard chez l’enfant: le tirage au mort des couples. *Acta Psychologica, 7,* 323-336.

Truran, J. (1985). Children’s Understanding of Symmetry. *Teaching Statistics, 7(3),* 69-74.

Truran, K. (1995). Animism: A View of Probability Behaviour. In Atweh, Bill and Flavel, Steve (eds) *MERGA 18: GALTHA Proceedings of the Eighteenth Annual Conference of the Mathematics Education Research Group of Australasia* (pp. 537–542) Darwin: MERGA .

Watson, J., Collis, K., and Moritz, J. (1995). Children’s Understanding of Luck. In Atweh, Bill and Flavel, Steve (eds) *MERGA 18: GALTHA. Proceedings of the Eighteenth Annual Conference of the Mathematics Education Research Group of Australasia* pp. 550-556) Darwin: MERGA.

Wollring, B. (1994). Animistische Vorstellungen vor Vor–und Grundschulkindern in Stochastischen Situationen. In *Journal für Mathematik Didaktik, 15,* 3-34.

Yost, P. A., Siegel, A. E. and Andrews, J. M. (1962). Nonverbal Probability Judgements by Young Children. *Child Development, 33,* 769-780.