Kriens, July 2021

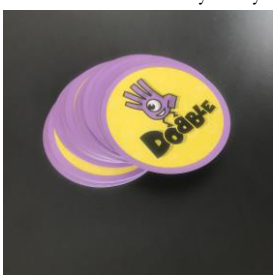
Dear Readers

I have always had a weakness for mathematical and physical games and gadgets. The combination of the complexity and importance of mathematical and physical principles with the fun and entertainment of games is in my eyes something wonderful. Having been asked to play again in the past few years thanks to my grandchildren, I was able to discover that some of the games that they play fantastically well and with which they spend almost every free minute, are based on mathematical and physical laws.

For a few years now, the so-called "Beyblades" can be found in many children's bedrooms. What sounds unbelievably modern and abstract are in reality nothing other than spinning tops or whirligigs, which come in a rather futuristic design. The spinning tops consist of various parts, which have to be put together. It goes without saying that there are many different models; after all, the manufacturers have to earn as much money as possible from them. What is special about the Beyblades is that the tops can fight each other, whereby the winner is the last one to be still spinning in the arena. Depending on their structure, the Beyblades can be particularly good in attack, in defence or in endurance. The children unconsciously make use of this fact and assemble an opponent for a fight who is either particularly attacking, stable or long-spinning. They know that the smallest and lightest possible Beyblade is a good attacker. A Beyblade with a thin point has good endurance and a slow spinning Beyblade – due to its size and weight – is a good defender. The underlying theoretical principles of moment of inertia, friction and gyroscopic effect still remain hidden from them, but in an empirical way they experience physical laws and use them for their play. They also notice that from a few Beyblades (which consist of three parts) you can create a multiple of Beyblades through the combination of the parts.

Another example of a board game with a complex background is "Dobble" [1]. In this game there are over 50 symbols, 55 cards and 8 symbols per card. There is always exactly one matching symbol between two cards.

Time after time, the children and also the adults are amazed that there is actually only one matching symbol and wonder how that works. The explanation lies in the mathematical principle that two straight lines have exactly one common point.



Graphically, it is a matrix consisting of:

- 7×7 points arranged at right angles,
- 8x7 straight lines which connect the points horizontally, vertically and with various slopes from 1–6 (whereby sloping straight lines after leaving the square field in terms of the divisional remainder re-enter on the opposite side and other possible straight lines are not considered which connect the same points, for example, the straight lines with a slope of 1/2 connect the same points as those with a slope of 4),
- 8 further points, which represent the intersections of parallel straight lines at infinity,
- and one straight line that connects the points at infinity.

I have great admiration for these clever minds, who manage to combine play, fun, mathematics and physics in such a way that a game emerges from it that captivates young and old. May these games subliminally cultivate a love for mathematics and physics in the children.

Kind regards

Georges Mandanis

[1] A game by Denis Blanchot, Jacques Cottereau and Play Factory.
M. Deléglise, Plans projectifs, arithmétique modulaire et Dobble. University of Lyon, 27 February 2013

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