

# Eco-Friendly Game Design

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*Most manufacturing processes create waste by-products, and games are no exception. This article demonstrates how such by-products can be successfully ‘upcycled’ and reused as game components in their own right, through several practical examples. We distinguish between strong and weak upcycling, and show that both approaches have ecological benefits in reducing waste material and economic benefits in reducing manufacturing costs.*

## 1 Introduction

UPCYCLING, also known as *creative reuse*, is the practice of recycling waste by-products into new high-quality goods, such that ‘old products are given more value, not less’ [1]. This practice of minimising and effectively utilising wastage is not only an environmental matter, but can have economic benefits [2]. Large companies that manufacture in volume can save significant amounts of money, and it can mean the difference between success or failure for small companies working on tight margins; ‘eco’ here stands for both ‘ecological’ and ‘economical’.

This is very true of game manufacturing, in which the production of each component will typically produce superfluous by-products. However, there is constant pressure on game publishers to release new designs with novel components, which encourages the *opposite* of reusing old products. So how can game designers implement upcycling to benefit from it?

We identify three levels of upcycling:

1. *Strong*: By-products are used exclusively to make new products.
2. *Weak*: By-products are used in new products along with other parts.
3. *False*: By-products are used in new products along with other parts that create further by-products.

Strong upcycling, which effectively produces zero wastage, is obviously the ideal form to be pursued. Weak upcycling is still desirable but dilutes the benefits, while false upcycling offers few real benefits.

This paper presents case studies of game designs that demonstrate the principles of strong and weak upcycling. All examples are published by Nestorgames, an independent board game company owned and run by the first author.

## 2 Strong Upcycling

The first example shows how the manufacture of one particular game created by-products that led inadvertently – but almost inevitably – to the design of another game.

### 2.1 Stax

Stax, shown in Figure 1, is a tile placement game invented by the second author in 2010.<sup>1</sup>

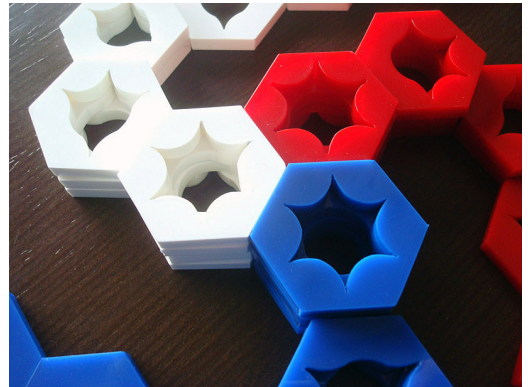


Figure 1. The game of Stax.

Each tile is a hexagon with a circular hole cut out and embellished with 0 to 6 notches or pointers along some of the six hexagonal axes. Each player has 13 such tiles of their colour, representing all unique combinations of 0 to 6 notches.

The rules of Stax are not important here; suffice it to say that for the game to work: 1) the notches on each tile should be visible from both sides, and 2) players should be able to see ‘through’ tiles stacked on others to check the notches of the tiles underneath.

Laser cutting the notched holes out of the tiles was the obvious solution. This produces attractive pieces that fit the game’s specification, at a

<sup>1</sup>[http://www.nestorgames.com/#stax\\_detail](http://www.nestorgames.com/#stax_detail)