Non-Abelian Jigsaws

Bob Huxley

All 2-D Jigsaws are Abelian

- The action of (correctly) placing a jigsaw piece does not impede the correct placing of any other piece. The order of operation is clearly non-critical.

- A 2-D jigsaw with N pieces can, in theory, be solved in N! distinct orders (though non-contiguous pieces would be problematical).

- Solvers generally complete the outside and work inwards.

Jigsaw Cutters are Evil

- Cut into corners: no right-angled pieces

- False internal 'edges' and 'corners'

- <u>Very</u> short outside edge sections

- Internal gaps

- Wavy edges

- CUTTING A SOLID BLOCK OF WOOD

Peter Stocken

- Active 3-D cutter 1973 – 2019

- Patriarch of jigsaw-cutting dynasty

- puzzleplex.co.uk

3-D Jigsaw Internal Structure

- Generally 4-deep, occasionally 5- or 6-deep

- Held together by pegs in grooves

- Geometry <u>severely</u> constrains solving/taking-apart order

- Internal pieces have HIGHLY irregular shapes

- Solvers typically work from the outside towards the centre

- Operations of assembly/disassembly are rarely Abelian

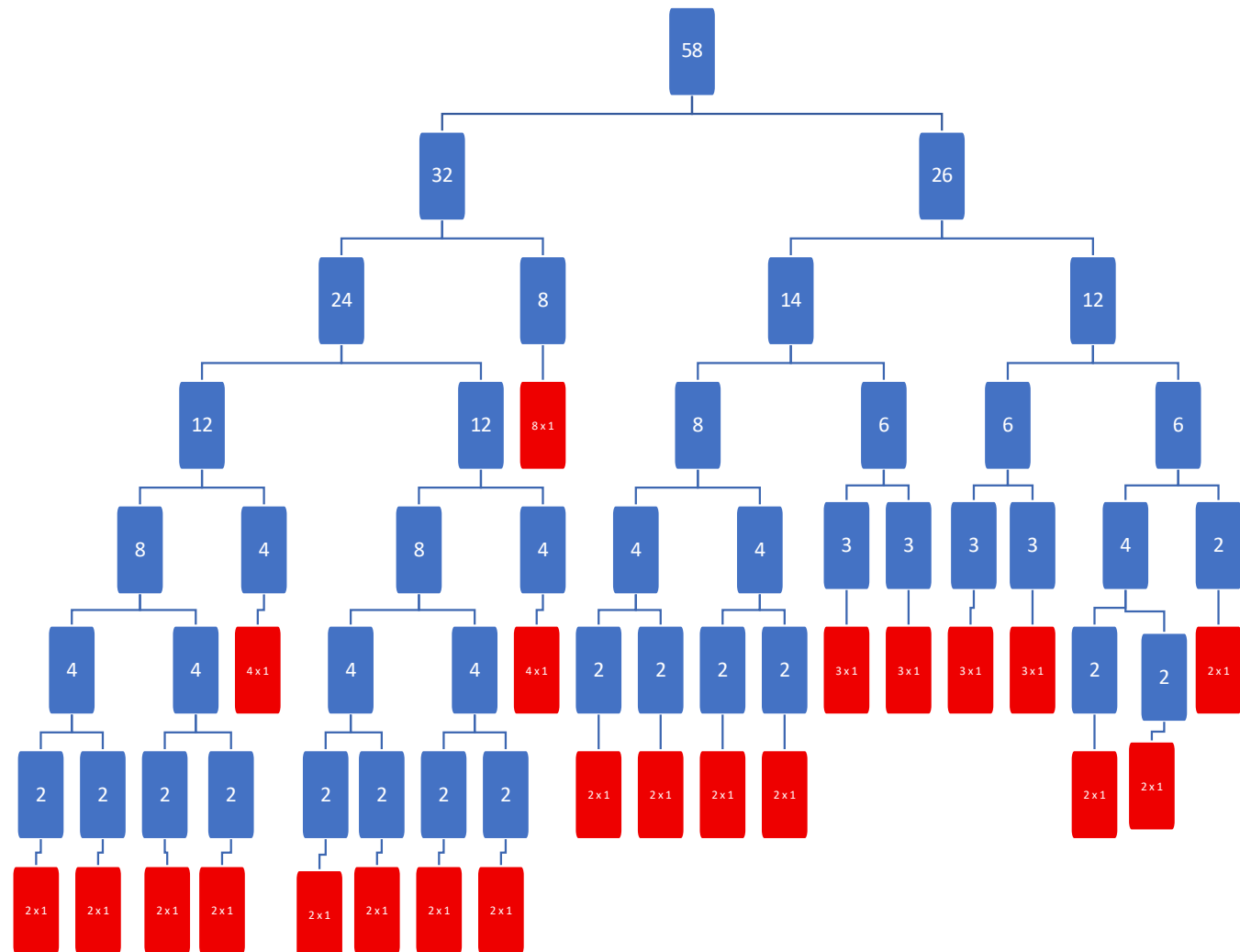# Cyprus Jigsaw

Cyprus Jigsaw: Initial Disassembly

Orders of Cyprus Pieces

Order	1	2	3	4	5	6	7	8
Pieces	0	0	8	0	22	12	16	0
Average Order	5.48							

Internal Structures of Various 3-D Puzzles

Cutter	Puzzle	Wood	Layers	Pieces	No. of Pieces of Order									Average Order
					1	2	3	4	5	6	7	8	9	
Stocken	Penguin	Holly	4	52	0	0	0	8	14	17	11	0	0	5.30
	Cyprus	Olive	4	58	0	0	8	2	22	10	16	0	0	5.48
Holmes	Cube	Cedar	4	64	0	0	0	0	32	32	0	0	0	5.50
Stocken	Hexagon	Yew	6	60	0	0	0	2	28	12	15	2	0	5.78
	Harlequin	{42}	5	60	0	0	6	0	17	17	12	8	0	5.88
	Cube	Padauk	6	70	0	0	0	0	33	17	14	2	4	5.96
	Octagon	Rosewood	6	93	0	0	0	2	25	25	23	14	4	6.37

Circles of Hell

- Seventh Circle of Hell: Violence

- Eighth Circle of Hell: Sorcery

- Ninth Circle of Hell: Treachery