

Richard Brak as a role model



In memory, February 7, 2022,
by Judy-anne Osborn

Apprenticeship: how to give a talk



Judy-anne Osborn



Richard Brak as a role model

Beautiful slides

A Universal Bijection for Catalan Families

R. Brak

School of Mathematics and Statistics
University of Melbourne

October 25, 2018

The Catalan Problem

- Over 200 families of Catalan objects:
Richard Stanley: "Catalan Numbers" (2015)
- Regular trickle of new families ...
- Alternative Tableau (2015) – related to Weyl algebra



- Floor plans (2018)





thought and communicated in pictures, e.g.



Figure 3. An example (a) of the use of terraces to uniquely factorize the Ballot path into D-factors (b).

Published in 2001

Return polynomials for non-intersecting paths above a surface on the directed square lattice

R. Brak, J. Essam



Aside on pictures:



PART III: Randomness Normality Random-ish walks and ... Special functions Number walks Walks on 'reals' Features of our walks Other

EXTENDED ABSTRACT

Long before current graphic, visualisation and geometric tools were available, John E. Littlewood (1885-1977) wrote in his delightful *Miscellany*¹:

A heavy warning used to be given [by lecturers] that pictures are not rigorous; this has never had its bluff called and has permanently frightened its victims into playing for safety. Some pictures, of course, are not rigorous, but I should say most are (and I use them whenever possible myself). [p. 53]

¹J.E. Littlewood, *A mathematician's miscellany*, London: Methuen (1953); Littlewood, J. E. and Bollobás, Béla, ed., *Littlewood's miscellany*, Cambridge University Press, 1986.



gave accessible examples:

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Example: Dyck path Magma

- Dyck Paths



- Product



- Generator: $\varepsilon = \circ$ (a vertex).

- Examples



- Norm = Number of up steps + 1

Aside on best motivation for learning:

Achievable challenge!







's examples suggest *analogies*

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Example: Triangulation Magma

- Polygon Triangulation's



- Product:



- Generator $\epsilon = \bullet$

- Examples:

$$\begin{array}{c} \bullet + \bullet = \bullet \\ \bullet \vee \bullet = \bullet \\ \bullet + \bullet = \bullet \\ \bullet \vee \bullet = \bullet \end{array}$$

- Norm = (Number of triangles) + 1

Example: Dyck path Magma

- Dyck Paths



- Product



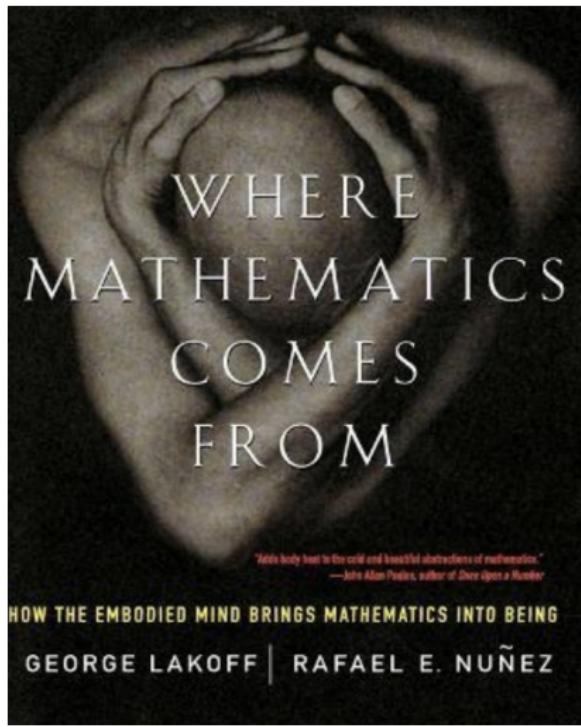
- Generator: $\epsilon = \circ$ (a vertex).

- Examples

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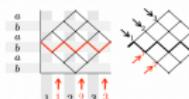
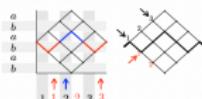
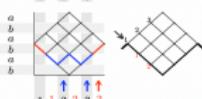
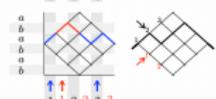
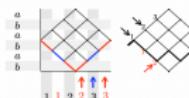
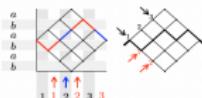
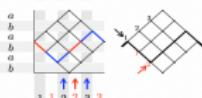
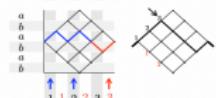
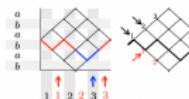
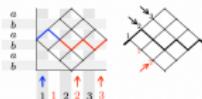
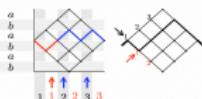
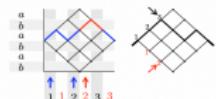
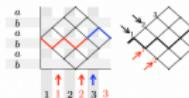
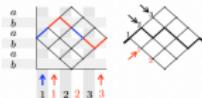
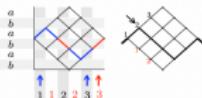
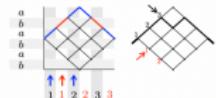
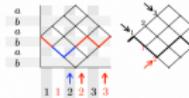
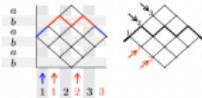
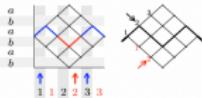
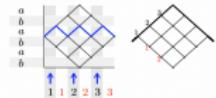
- Norm = Number of up steps + 1

Aside: Maths is built on *analogies*



Richard Brak appreciated effort

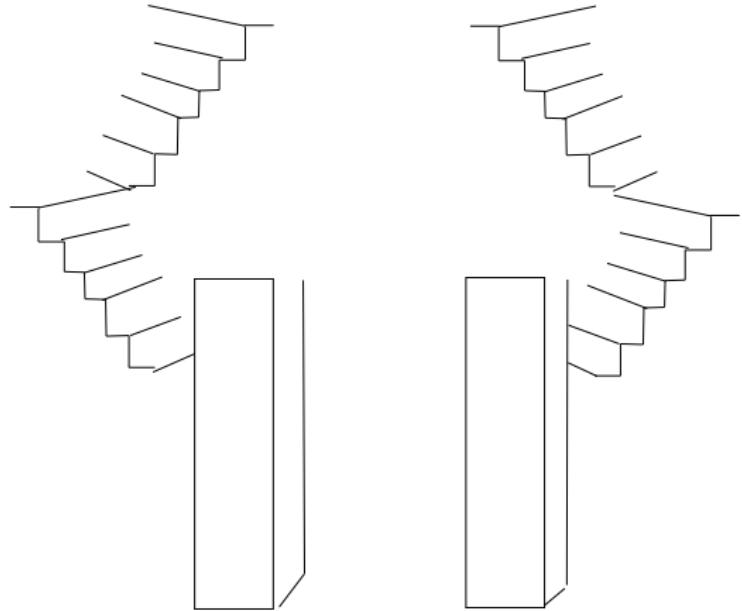
100's of examples



She's outdone
either of us!



And at that stage I didn't have any solutions!



I would go tearing up those stairs, and

- ▶ if I had something, I'd explain it, and together we'd go further
- ▶ if I hadn't solved *anything*, I'd explain *that*, which somehow always led to getting somewhere

And if we hadn't spoken for a while:

"how's things?"



always had time for me

(and so many many others!)



inducted me into his community

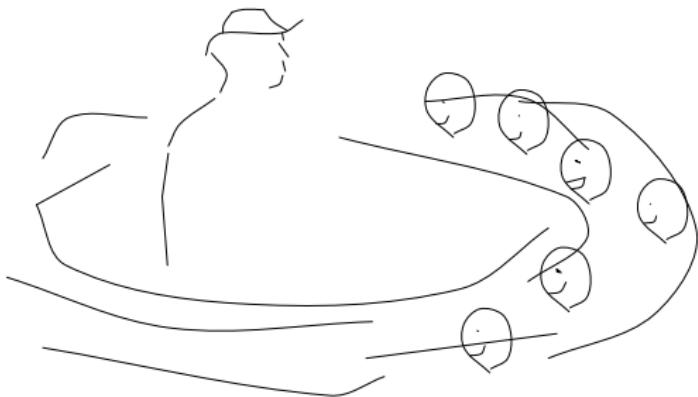




told me lots of tacit knowledge, eg.

- ▶ You go to two conferences a year: AustMS and one speciality, and this [Annual Stat Mech meeting] is that one.

At conferences, students tended to gather around



Because he listened? Really saw people? Or just his enthusiasm?



was interested in everything! (Just about!)



*"You see the trouble with nails is that they're not screws,
and when a big storm comes along ... "*

In little vignettes inbetween maths we talked about



• • •

We would talk about creativity, e.g.  would say

I don't believe you get less creative as you get older - I think its just there's more crap gets in the way ...



Richard Brak was creative in maths, community, art, archeology, ...

A Universal Bijection for Catalan Magmas

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May 28, 2019

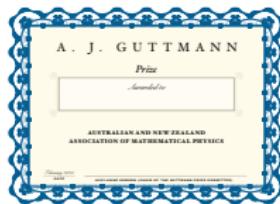
arXiv:1808.09078v2 [math.CO] 27 May 2019

Weyl chambers for short step Quarter-plane Lattice Paths.

Richard Brak

September 6, 2021

arXiv:2002.07319v1 [math.CO] 18 Feb 2020



WWW.FINDINGSTONES.COM

He appreciated people!



Judy-anne Osborn

Richard Brak as a role model

Richard Brak has left us

his example of how to be a person of integrity, care and joy, his maths, his art, photos he took showing how he saw the world ...



took this photo of me

