



## Session 2

# More Computational Thinking

## By the end of this session participants will have ...

Worked through problems using the pillars of Computation Thinking:

- abstraction, pattern recognition, decomposition, algorithm formation.

Designed experiments / trials which are common in algorithm formation.

Extended their solutions to coding specific and general solutions in *Python*.

Explored CT problems related to other areas and subjects such as Chemistry, Music, English.

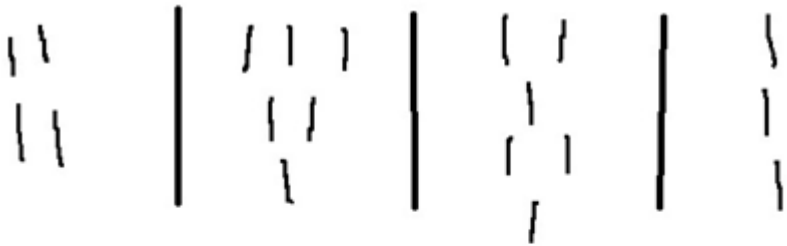
Explored use of differentiation in these problems.

# Providing a Full Solution

- Pillars of CT
- Coding
- Full Solution
- Cross-curricular
- Differentiation

# Providing a Full Solution – in pairs


Solution for the Stick game



**4 winning solutions.**

**Achievable in one move.**

**Try coding.**

 Untitled

File Edit Format Run Options Window Help

---

# Code for Stick Game

- `sop = [4,3,2,1]`
- `# Enter current state of play below:`
  
- `sop = [3,2,2,1]`
  
- `if sop ==[4,3,2,1] or sop ==[4,2,1,0]:`
- `sop = [3,2,1,0]`
  
- `elif sop ==[3,2,1,1]:`
- `sop = [2,2,1,1]`
  
- `print (sop)`

# Fuinneog briste

- Somebody has broken the window in the classroom. There are three suspects: Áine, Bébhinn and Caitlin. Áine said that Bébhinn broke the window. Bébhinn and Caitlin also said something, but nobody remembers what they said. It is known that exactly one of the girls broke the window and only this girl told the truth. Who broke the window?

Áine

Bébhinn

Caitlin

# Code for Fuinneog briste

- Witness = A
- Accused = B
- Other = C
  
- if Witness == Accused:
  - Culprit = Witness
  
- elif Witness != Accused:
  - Culprit = Other
  
- print (Culprit)



# It's all Greek (or Latin)

**Latin**

		
panis	ignis	equus
		
vesper	populus	sol
		
arbor	terra	ovum

Greek Alphabet and Symbols					
Α α Alpha	Β β Beta	Γ γ Gamma	Δ δ Delta	Ε ε Epsilon	Ζ ζ Zeta
Η η Eta	Θ θ Theta	Ι ι Iota	Κ κ Kappa	Λ λ Lambda	Μ μ Mu
Ν ν Nu	Ξ ξ Xi	Ο ο Omicron	Π π Pi	Ρ ρ Rho	Σ σ, ς Sigma
Τ τ Tau	Υ υ Upsilon	Φ φ Phi	Χ χ Chi	Ψ ψ Psi	Ω ω Omega

# It's all Greek (or Latin)

- **Situation:**
- In the town of Ballybridge, a new school was formed by a merger of a boys' and a girls' school.
- The girls' school traditionally offered Latin, and the boys' school offered Greek. When the merger happened early in September, the 1<sup>st</sup> year girls and 1<sup>st</sup> year boys were already organised into a Latin and a Greek class respectively.
- There were 30 girls in the Latin class and 18 boys in the Greek class. It was decided to transfer 6 of the girls to the Greek class. Later that day however, it transpired that the Greek classroom didn't have the resources to accommodate the extra students.
- It was decided to choose 6 students at random from the 24 students now in the Greek class, and these would have to go to Latin.
- After this change, are there more boys or more girls (or the same amount) taking a different language than originally assigned?

# It's all Greek (or Latin)

- **Tasks:**
- Try an unplugged solution, using CT strategies.
- Code the solution.
- Extend the coding to cover a general solution, where numbers of girls and boys vary.

# Greek / Latin Code

- `g_t_latin = int(input("How many girls went back to Latin?: "))`
- `#g_latin = 30 - (g_greek)`
- `b_latin = 6 - (g_t_latin)`
- `#b_greek = 18 - (b_latin)`
- `g_greek = 6 - (g_t_latin)`
- `print ("Girls in Greek: ", g_greek, "Boys in Latin: ", b_latin)`

# Flann O'Brien



# Flann O'Brien Forensically

- Read the following 3 extracts.
- Which 2 come from the same source.
- Which features are important?
- Assign a weight to these features?
- Code the solution.

# Extract 1

- A key feature of O'Nolan's personal situation was his status as an Irish government civil servant, who, as a result of his father's relatively early death, was obliged to support ten siblings, including an elder brother who was an unsuccessful writer. Given the desperate poverty of Ireland in the 1930's to 1960's, a job as a civil servant was considered prestigious, being both secure and pensionable with a reliable cash income in a largely agrarian economy. The Irish civil service has been, since the Irish Civil War, fairly strictly apolitical: Civil Service Regulations and the service's internal culture generally prohibit Civil Servants above the level of clerical officer from publicly expressing political views. As a practical matter, this meant that writing in newspapers on current events was, during O'Nolan's career, generally prohibited without departmental permission on an article-by-article, publication-by-publication basis. This fact alone contributed to O'Nolan's use of pseudonyms, though he had started to create character-authors even in his pre-civil service writings. O'Nolan rose to be quite senior, serving a private secretary to Seán T. O'Kelly (a minister and later President of Ireland) and Seán McEntee, a powerful political figure, both of whom almost certainly knew O'Nolan was na gCopaleen.
- In reality, that O'Nolan was Flann O'Brien and Myles na gCopaleen was an open secret, largely disregarded by his colleagues, who found his writing very entertaining; this was a function of the makeup of the civil service, which recruited leading graduates by competitive examination—it was an erudite and relatively liberal body in the Ireland of the 1930's to the 1970's.

## Extract 2

- A fact insufficiently reflected upon is that the first published piece signed by ‘Flann O’Brien’ was not in 1939, on the cover of the novel *At Swim-Two-Birds*. It was in 1938, and it was a letter.
- In October 1938, in the Letters to the Editor section of *The Irish Times*, Seán Ó Faoláin and Frank O’Connor were deliberating about ideal practices for Irish theatre when a new correspondent asked if ‘the petulant bickering’ between them was ‘a private affair or whether any high-brow gentleman of refined tastes’ could take part.
- Without waiting for a response, the new interlocutor, one Flann O’Brien of Dublin, proceeded to ridicule the previously earnest discussion, goading Ó Faoláin and O’Connor in letters across *The Irish Times* and the *Irish Independent*. In January 1939, O’Brien suggested that they replace pens with fists and meet for a fight behind the fives court. Ó Faoláin asked that the ‘Man in the Gaelic Mask’ breathe through his nose to shut his month; O’Connor demanded that O’Brien provide them with his address.
- Brian O’Nolan began his creative career in the early 1920s, as a pre-teen, when he and his brother Ciarán drew illustrated ‘films’ that they projected onto the garage wall using a lens, a lamp and paraffin-soaked paper. Rather later, in the 1940s, Myles na gCopaleen became the name behind the *Cruiskeen Lawn*, but it was in letters that Flann O’Brien found his first home in print.



## Extract 3

- In 1954, Behan's first play *The Quare Fellow*, was produced in Dublin. It was well received; however, it was the 1956 production at Joan Littlewood's Theatre Workshop in Stratford, London, that gained Behan a wider reputation. This was helped by a famous drunken interview on BBC television. In 1958, Behan's play in the Irish language *An Giall* had its debut at Dublin's Damer Theatre. Later, *The Hostage*, Behan's English-language adaptation of *An Giall*, met with great success internationally. Behan's autobiographical novel, *Borstal Boy*, was published the same year and became a worldwide best-seller and by 1955, Behan had married Beatrice French Salkeld, with whom he later had a daughter Blanaid Behan in 1963.
- By the early 1960s, Behan reached the peak of his fame. He spent increasing amounts of time in New York, famously declaring, "To America, my new found land: The man that hates you hates the human race." By this point, Behan began spending time with people including Harpo Marx, Arthur Miller and was followed by a young Bob Dylan.

# Cryptocurrency CT

- Harvest
- Semi-primes: 'nearly' prime numbers
- Use heuristics, CT pillars
- Breakdown the problem



# Cryptocurrency CT

- Activity: find factors of a semi-prime eg 323
- Patterns in a number's last digit
- Reduce possibilities
- Code a general solution





# Semi-Prime Solution 3293

- for i in range(2, 60):
  - if 3293 % i == 0:
  - print (i, 3293/i)
  - else:
  - i = i+2

# General Semi-prime solution – up to 10,000

- for i in range(2, 100):
  - if 3293 % i == 0:
    - print (i, 3293/i)
  - else:
    - i = i+2

# CompSci meets Google



Computational Thinking  
for Educators



[g.co/computationalthinking](https://g.co/computationalthinking)

# Google CT Examples

- Which ones are useful?
  - Sometimes those aimed at younger audiences!
    - More opportunities for coding
  - Eg: “[Doing the -ing thing](#)”

```
myverb = raw_input('Please enter a verb: ')

def ing(verb):
    pres_part = verb + 'ing'
    print '\npresent participle:', pres_part

ing(myverb)
```



# Working through Google Examples -

- The –ing thing: Click [here](#)
- [https://docs.google.com/document/d/1z0JlUalph-8T360ybG3U4hvNRkwivO0ek\\_\\_KdfhJm3Y/edit](https://docs.google.com/document/d/1z0JlUalph-8T360ybG3U4hvNRkwivO0ek__KdfhJm3Y/edit)
- Python Introduction: Click [here](#)
- [https://docs.google.com/document/d/1T\\_hp4D2p99mn9xLDwVfhK\\_OfGQuGaNtWY0eu1kqulEA/edit](https://docs.google.com/document/d/1T_hp4D2p99mn9xLDwVfhK_OfGQuGaNtWY0eu1kqulEA/edit)
- CT Concepts Guide: Click [here](#)
- <https://docs.google.com/document/d/1Hyb2WKJrjT7TeZ2ATq6gsBhkQjSZwTH-xfpVMFEn2F8/edit>

# Chemistry: Boyle's Law

Click [here](#)

<https://docs.google.com/document/d/1VmuZA5gtbOdO4A6Hqxc4ImquYiTxcYs-ssHk8sLGIA/edit>

# Music: Create using Algorithms

Click [here](#)

[https://docs.google.com/document/d/1oklyvpDsLH\\_SS2C15-tLGwPYUNUNuRcVDNlo4KUJBGM/edit](https://docs.google.com/document/d/1oklyvpDsLH_SS2C15-tLGwPYUNUNuRcVDNlo4KUJBGM/edit)

# Maths: Sort World's Cities

Click [here](#)

[https://docs.google.com/document/d/1tj7dQLjychqBGmxHknBxL1fA\\_amSKOv7O5Xi-nOGOk/edit](https://docs.google.com/document/d/1tj7dQLjychqBGmxHknBxL1fA_amSKOv7O5Xi-nOGOk/edit)

# Debrief

- Groups report back evaluating Google Resources and sharing ideas.



