# The Curious Case of Poirot's Centrality

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Agatha Christie's detective fiction comprises several recurring series, each centred on a principal detective or other recurring character and accompanied by a cast of supporting characters. Although these series are largely independent, Christie occasionally reused characters across them, creating a connected fictional universe. We study the co-occurrence graph of this recurring-character universe, in which two characters are adjacent whenever they appear together in at least one novel or short story. We construct a backbone graph that preserves the metric structure of the full network. The resulting reduction reveals that a relatively small number of crossover characters are responsible for the connectivity of the universe. We use it to determine its centre and diameter. In particular, we prove that Hercule Poirot is the unique centre of the co-occurrence graph and that its diameter is five.

**Spoiler warning.** This article discusses the recurring casts and relationships of Agatha Christie's novels and short stories. Although the focus is on character co-occurrence rather than plot, the presence of a character in a particular work necessarily reveals that the character survives until that appearance. In addition, some character relationships and statuses (such as marriages and partnerships) are established only during the course of the stories and may therefore constitute minor spoilers. Readers wishing to avoid such information are advised to read Christie's works before continuing.

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## 1 Introduction

Agatha Christie (1890–1976) created one of the largest and most influential collections of detective fiction. Although many of her novels and short stories are self-contained, a substantial number feature recurring characters. These recurring appearances connect otherwise independent stories into a single fictional universe, whose structure can be studied using the tools of graph theory.

A particularly notable example of Christie's use of crossover characters is *Cards on the Table* (1936), which brings together four of her major recurring characters—Hercule Poirot, Colonel

Race, Superintendent Battle, and Ariadne Oliver. More generally, recurring characters connect the various detective series and supporting casts into a single connected network.

The most interesting features of the graph arise from a small number of characters who cross the boundaries between Christie's different series. These characters do not necessarily have the largest number of appearances, but they act as bridges between otherwise separate parts of the network. Examples include Inspector Japp, who links Poirot's world with Tommy and Tuppence Beresford, and Mr. Satterthwaite, whose association with Harley Quin provides the connection between the Quin stories and the wider universe.

The data concerning character appearances and publication history were compiled from standard Christie reference works [1, 2, 3]. In particular, Bunson's work provides a nearly exhaustive catalogue of Christie's publications and the characters appearing in them, excluding posthumously published material, which is instead covered using Curran's work.

Let $\mathcal{W}$ denote the collection of Christie's novels and short stories containing at least one recurring character. We define the *co-occurrence graph* $G$ by taking as vertices all recurring characters appearing in the works of $\mathcal{W}$, with two vertices joined by an edge whenever the corresponding characters appear together in at least one work.

Rather than analyse $G$ directly, we identify a much smaller *backbone graph* $H$ capturing the essential metric structure of the recurring-character universe. The graph $H$ is constructed so as to satisfy the following properties:

1. every vertex of $G$ is adjacent to at least one vertex of $H$;
2. every shortest path in $G$ is backbone-equivalent to a shortest path in $H$.

Here, two paths are said to be *backbone-equivalent* if one can be obtained from the other by replacing maximal subpaths whose internal vertices lie outside $H$ with shortest subpaths joining the same pair of vertices of $H$. Once $H$ has been identified, the centre and diameter of the full co-occurrence graph can be determined by analysing this much smaller graph.

## 2 The backbone of the recurring-character universe

The complete co-occurrence graph contains many secondary characters who contribute little to its large-scale structure. The purpose of the backbone graph is therefore not to discard information arbitrarily, but to separate local detail from global connectivity. The resulting graph retains the features relevant for the metric analysis while remaining small enough to examine directly.

The recurring-character universe naturally decomposes into a number of major subuniverses, each centred on one of Christie's principal recurring characters. Every recurring character considered in this paper appears in at least one work belonging to one of these subuniverses. Listed in

chronological order of first appearance, the corresponding central characters are:

- Hercule Poirot, debut: *The Mysterious Affair at Styles* (1920);
- Tommy and Tuppence Beresford, debut: *The Secret Adversary* (1921);
- Colonel John Race, debut: *The Man in the Brown Suit* (1923);
- Harley Quin, debut: *The Coming of Mr Quin* (1924);
- Superintendent Battle, debut: *The Secret of Chimneys* (1925);
- Miss Jane Marple, debut: *The Tuesday Club Murders* (1927);
- Christopher Parker Pyne, debut: *Are You Happy? If Not Consult Mr. Christopher Parker Pyne* (1932);
- Ariadne Oliver, debut: *Are You Happy? If Not Consult Mr. Christopher Parker Pyne* (1932).
- Mr. Robinson, debut: *Cat Among the Pigeons* (1959).

Although Ariadne Oliver first appears in a Parker Pyne story, she is most closely associated with Hercule Poirot, appearing alongside him in numerous novels and serving as one of the four principal investigators in *Cards on the Table* (1936). She also appears independently of Poirot in *The Pale Horse* (1961), so she is treated as defining a subuniverse in her own right.

Mr. Robinson also occupies a special position. Although he is not a major detective, he defines a distinct subuniverse because *Passenger to Frankfurt* (1970) contains recurring characters associated only with him. He also appears with Poirot in *Cat Among the Pigeons* (1959), with Miss Marple in *At Bertram's Hotel* (1965), and with Tommy and Tuppence Beresford in *Postern of Fate* (1973), thereby linking his subuniverse to several of the others.

Besides these central characters, a small number of recurring characters appear in more than one of the above subuniverses. Excluding the central characters themselves, these are precisely:

- Inspector James Japp appears throughout the Poirot series, beginning with *The Mysterious Affair at Styles* (1920), and also appears in *The Secret Adversary* (1921) with Tommy and Tuppence Beresford.
- Mr. Satterthwaite is Harley Quin's regular companion from *The Coming of Mr Quin* (1924) onward, but also appears with Poirot in *The Second Gong* (1932), *Three Act Tragedy* (1934), and *Dead Man's Mirror* (1937).
- Miss Felicity Lemon is introduced as Parker Pyne's secretary in *Are You Happy? If Not Consult Mr. Christopher Parker Pyne* (1932), but from *How Does Your Garden Grow?* (1935) onward she serves as Poirot's secretary.
- Caleb and Maud Dane Calthrop first appear in *The Moving Finger* (1942) with Marple and

later reappear in *The Pale Horse* (1961) with Ariadne Oliver.

- Inspector Meadows appears with Colonel Race in *The Man in the Brown Suit* (1923) and later with Poirot in *The Big Four* (1924).
- Amy Leatheran first appears with Poirot in *Murder in Mesopotamia* (1935) and later appears in *Passenger to Frankfurt* (1970), together with Mr. Robinson.
- John and Rhoda Despard appear in *Cards on the Table* (1936) with Poirot, Battle, Race, and Oliver, and later in *The Pale Horse* (1961).
- Colonel Ephraim Pikeaway appears together with Mr. Robinson in every work featuring the latter except *At Bertram's Hotel* (1965).
- Poirot's valet George, the private investigator Mr. Goby, Dr. John Stillingfleet, and Superintendent Albert Spence are recurring members of Poirot's supporting cast, but also appear in works featuring Ariadne Oliver.

We now construct the backbone graph. As representatives of the major subuniverses, we include one vertex for each central character, with the sole exception of Harley Quin. Since Quin appears only together with Mr. Satterthwaite, the latter provides the unique connection between the Quin subuniverse and the remainder of the recurring-character universe. Replacing Quin by Satterthwaite therefore yields a smaller graph without changing its connectivity.

Among the crossover characters, we include only those required to preserve the graph-theoretic structure of the full co-occurrence graph. These are Inspector Japp, Miss Lemon, and Caleb and Maud Dane Calthrop. The remaining crossover characters do not introduce any additional shortest paths between backbone vertices and therefore do not affect the properties required for our analysis.

Several modelling choices are involved in representing a fictional universe as a graph. Some recurring characters are naturally grouped together because their appearances are inseparable. For example, Tommy and Tuppence Beresford, and Caleb and Maud Dane Calthrop, are represented by single vertices in the backbone graph. Treating the members of these pairs as separate vertices would not affect the metric structure: whenever one member is adjacent to another character, the other member is adjacent as well. Consequently, in any shortest path between distinct characters, at most one member of the pair is required, and the choice of which member to use is arbitrary (except for the trivial paths joining the two members of the pair themselves).

A similar principle explains the omission of certain crossover characters from the backbone graph. For instance, Amy Leatheran appears only in works containing either Hercule Poirot or Mr. Robinson. Hence every neighbour of Amy Leatheran is already adjacent to at least one of these two backbone vertices. Any shortest path passing through Amy Leatheran can therefore be replaced by a path of the same or shorter length passing through Poirot or Robinson, unless Amy Leatheran is itself an endpoint of the path. The same argument applies to the other omitted

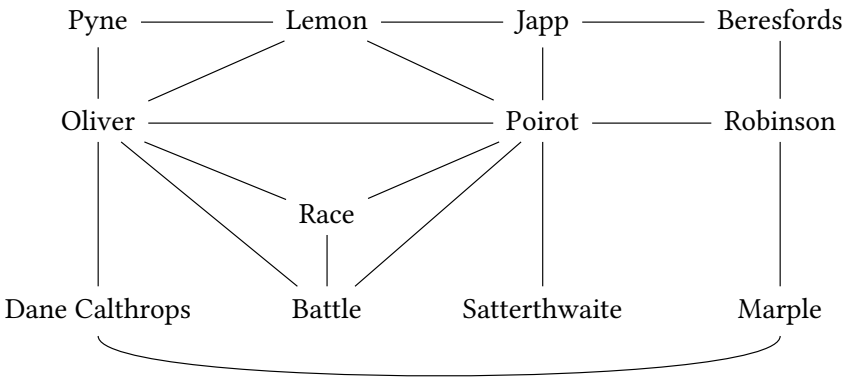



**Figure 1:** The backbone of Christie's recurring-character universe. Vertices represent the major recurring and crossover characters, with edges joining characters who appear together in at least one work.

crossover characters. Thus the construction of the backbone graph removes only vertices that do not provide additional shortest-path information.

The resulting backbone graph $H$ is shown in Figure 1. By construction, every recurring character not represented in the backbone graph is adjacent in the full co-occurrence graph to at least one backbone vertex. Furthermore, every shortest path in the full graph is backbone-equivalent to a shortest path in $H$. Hence, the backbone graph satisfies the required properties while retaining all the structural information needed for the analysis of the complete recurring-character network.

## 3 The centre and diameter

Since every recurring character lies within distance 1 of the backbone graph $H$, the metric properties of the full co-occurrence graph $G$ can be recovered from those of $H$. We first determine the centre of $G$.

**Theorem 1.** *Hercule Poirot is the unique centre of $G$. Moreover,*

$$\mathrm{ecc}(\mathrm{Poirot}) = 3,$$

*while*

$$\mathrm{ecc}(v) \geq 4$$

*for every vertex $v \neq \mathrm{Poirot}$.*

*Proof.* By construction of the backbone graph, every vertex of $G$ is adjacent to at least one vertex of $H$.

In $H$, Poirot is adjacent to

$$\{\text{Japp, Lemon, Oliver, Race, Battle, Robinson, Satterthwaite}\},$$

while the remaining backbone vertices,

$$\{\text{Marple, Beresfords, Pyne, Dane Calthrops}\},$$

are all at distance $2$ from Poirot. Consequently every vertex of $G$ is at distance at most $3$ from Poirot, and therefore $\mathrm{ecc}(\text{Poirot}) = 3$.

It remains to show that every other vertex has eccentricity at least $4$.

Suppose first that $v$ is not adjacent to Poirot. Then $v$ is not adjacent to at least one of Harley Quin or Christopher Parker Pyne. In the former case every path from $v$ to Quin contains the segment

$$\text{Poirot} \to \text{Satterthwaite} \to \text{Quin},$$

so $d(v, \text{Quin}) \geq 4$. In the latter case every path from $v$ to Parker Pyne contains

$$\text{Poirot} \to (\text{Oliver or Lemon}) \to \text{Pyne}$$

and again $d(v, \text{Pyne}) \geq 4$.

Now suppose that $v$ is adjacent to Poirot.

If $v = \text{Robinson}$, then

$$\text{Robinson} \to \text{Poirot} \to (\text{Oliver or Lemon}) \to \text{Pyne} \to \text{Aristopoulous},$$

where Aristopoulous appears only in *Have You Got Everything You Want? If Not Consult Mr. Christopher Parker Pyne* (1933), is a shortest path. Hence $d(\text{Robinson}, \text{Aristopoulous}) = 4$.

If $v$ is adjacent to Robinson but not to Marple, the same argument gives $d(v, \text{Aristopoulous}) \geq 4$.

Finally, if $v$ is adjacent to neither Robinson nor Marple, every path from $v$ to Raymond West, Marple's recurring nephew, contains the segment

$$\text{Poirot} \to \text{Robinson} \to \text{Marple} \to \text{West},$$

so $d(v, \text{West}) \geq 4$.

Thus every vertex distinct from Poirot has eccentricity at least $4$, proving that Poirot is the unique centre of $G$. □

The theorem gives a more precise meaning to Poirot's prominence. His central position is not

| | Marple | Beresfords | Dane Calthrops | Pyne |
|---|---|---|---|---|
| Marple | 0 | 2 | 1 | 3 |
| Beresfords | 2 | 0 | 3 | 3 |
| Dane Calthrops | 1 | 3 | 0 | 2 |
| Pyne | 3 | 3 | 2 | 0 |

**Table 1:** Distances between the backbone vertices at distance 2 from Poirot.

simply a consequence of appearing in more stories than any other character. Rather, it reflects the topology of Christie's fictional universe: Poirot lies at the intersection of several chains of connections linking otherwise distinct groups of recurring characters.

Knowing the centre immediately yields the estimate

$$\operatorname{diam}(G) \leq 2\operatorname{ecc}(\text{Poirot}) = 6.$$

To determine the exact diameter it remains to examine the distances between the outer branches of the backbone graph.

**Theorem 2.** *The co-occurrence graph $G$ has diameter* $\operatorname{diam}(G) = 5$.

*Proof.* The backbone vertices at distance 2 from Poirot are Marple, the Beresfords, Parker Pyne, and the Dane Calthrops. Their pairwise distances within $H$ are given in Table 1.

Every vertex of $G$ lies within distance 1 of a backbone vertex. Therefore, for arbitrary vertices $u, v \in G$,

$$d_G(u, v) \leq 1 + d_H(u', v') + 1,$$

where $u'$ and $v'$ are adjacent backbone vertices. Since the largest entry in Table 1 is 3, it follows that $d_G(u, v) \leq 5$, so $\operatorname{diam}(G) \leq 5$.

To see that this bound is attained, consider Raymond West and Harley Quin. A shortest path between them is

$$\text{West} \to \text{Marple} \to \text{Robinson} \to \text{Poirot} \to \text{Satterthwaite} \to \text{Quin},$$

which has length 5. Hence $\operatorname{diam}(G) = 5$. □

## 4 Concluding remarks

The recurring-character universe of Agatha Christie is assembled from a number of largely independent subuniverses linked by a comparatively small set of crossover characters. The backbone graph introduced in this paper shows that only a handful of these recurring characters are required to recover the metric structure of the complete co-occurrence graph.

Within this structure, Hercule Poirot occupies a unique position. Although his prominence is unsurprising given the size of his own series, it is the particular pattern of crossovers between otherwise independent subuniverses that makes him the unique centre of the graph. In particular, the links provided by characters such as Inspector Japp, Miss Felicity Lemon, Ariadne Oliver, Mr. Robinson, and Mr. Satterthwaite ensure that every recurring character lies within distance 3 of Poirot.

The analysis also illustrates the sensitivity of the graph to relatively few crossover appearances. For example, without the connection between Miss Marple and Mr. Robinson established in *At Bertram's Hotel* (1965), the distances between the Marple and Poirot subuniverses would increase, altering the metric structure of the network.

More broadly, this work provides a graph-theoretic description of Christie's recurring-character universe and shows how a comparatively small backbone graph is sufficient to determine global invariants such as the centre and diameter of the complete co-occurrence graph.

## References


[1] Matthew Bunson, *The Complete Christie: An Agatha Christie Encyclopedia*, Pocket Books, New York, 2000.

[2] Agatha Christie, *The Complete Short Stories*, 3 volumes, HarperCollins, London, 2008.

[3] John Curran, *Agatha Christie's Complete Secret Notebooks*, HarperCollins, London, 2009.