Freie Universität Berlin

Observations on **Knowledge Transfer** of **Professional** Software Developers during **Pair Programming**

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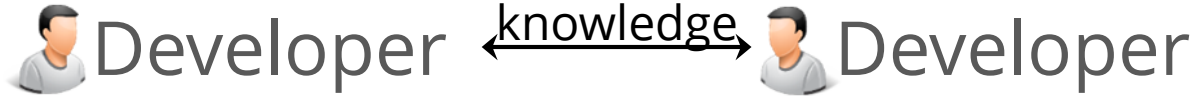
Typical pair programming scenarios

1. Solve a difficult problem

- Combined ideas
- Combined background knowledge



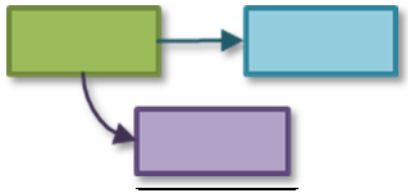
2. Introduce new team member

- System understanding
- Common practices, coding conventions

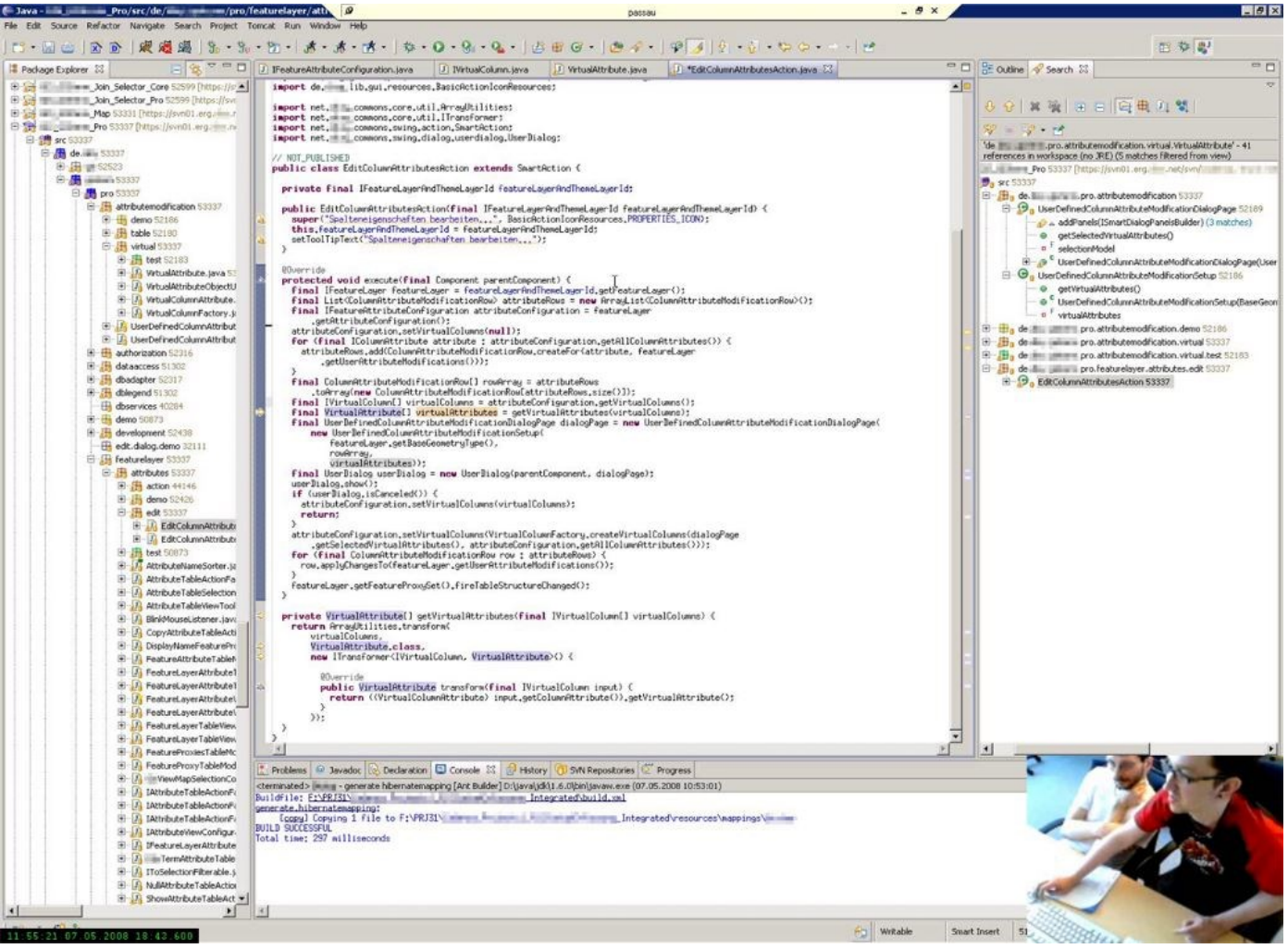
Research Goal

Characterize **how** effective and efficient **knowledge transfer works** in pair programming.

- Geared towards practitioners:
  - Formulate **patterns** of beneficial and problematic behavior



Data collection



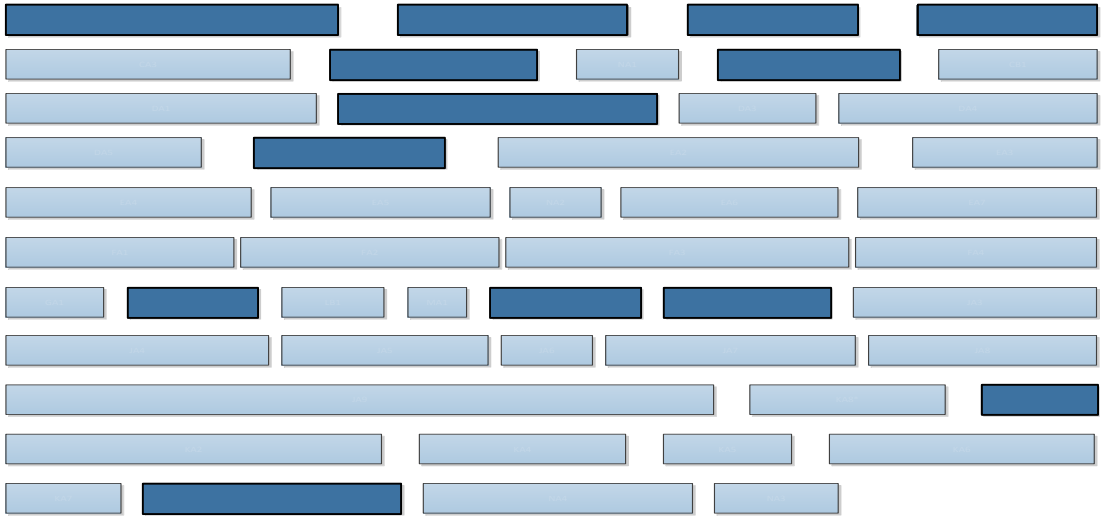
Authentic

- In-vivo recordings of professionals: no artificial pairs, tasks, or settings

Diverse

- different domains & pair types

Data analysis

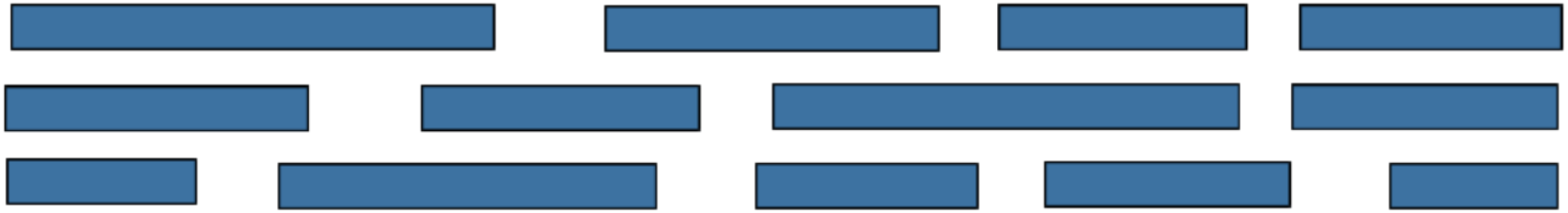


Lord of the Rings I-III

49+ Sessions from **11** companies

13 Sessions selected

Data analysis



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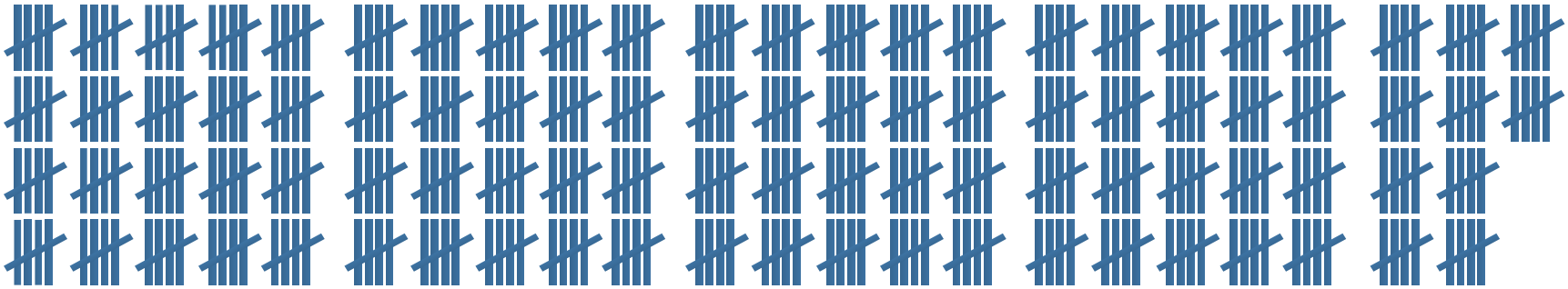
Grounded Theory
(Strauss & Corbin)

450 Knowledge Transfer Episodes analyzed



Three Examples

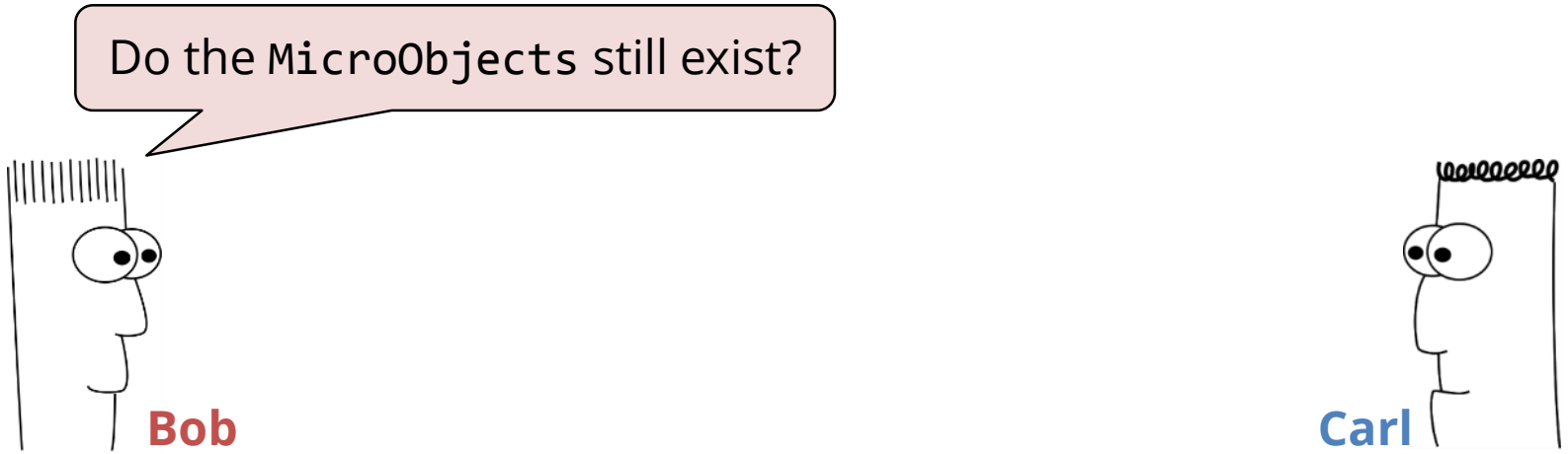
Example 1:
Efficient Pull Episode

Freie Universität Berlin

Context: Java, with complex self-written framework
Task: Get business object (“MiniObject”) from proxy object (“objectHandle”)

```
return objectHandle.fetchM;
```

- fetchMiniObject() CMMiniObject
- fetchMiniObject(boolean allowMicroObject)



Example 1:
Efficient Pull Episode

Freie Universität Berlin

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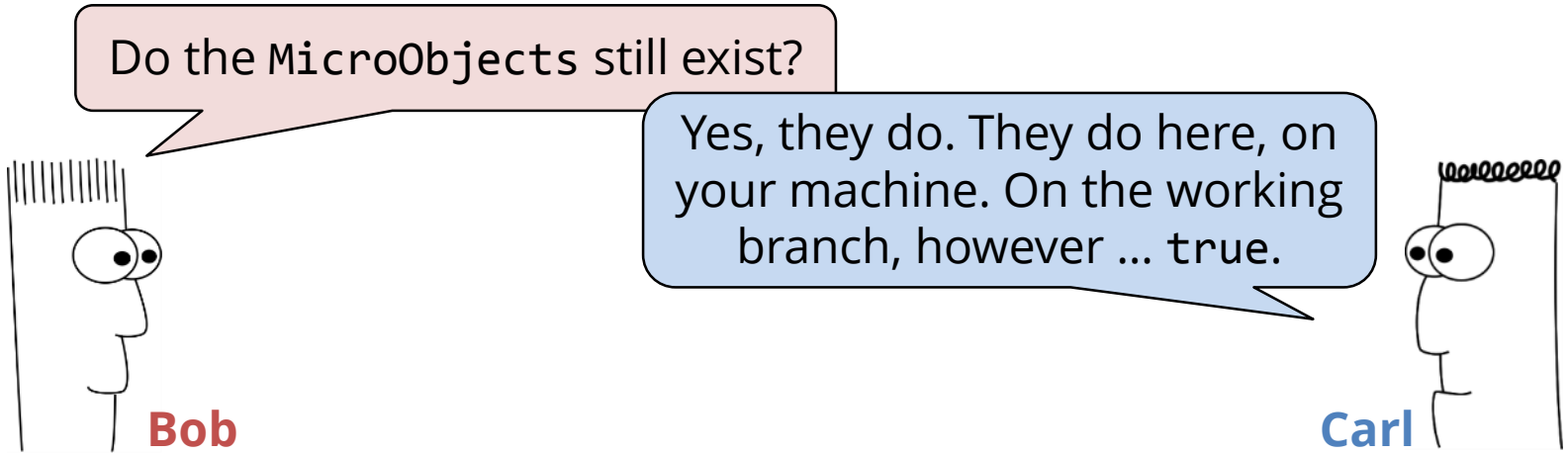
```
return objectHandle.fetchMiniObject(true);
```



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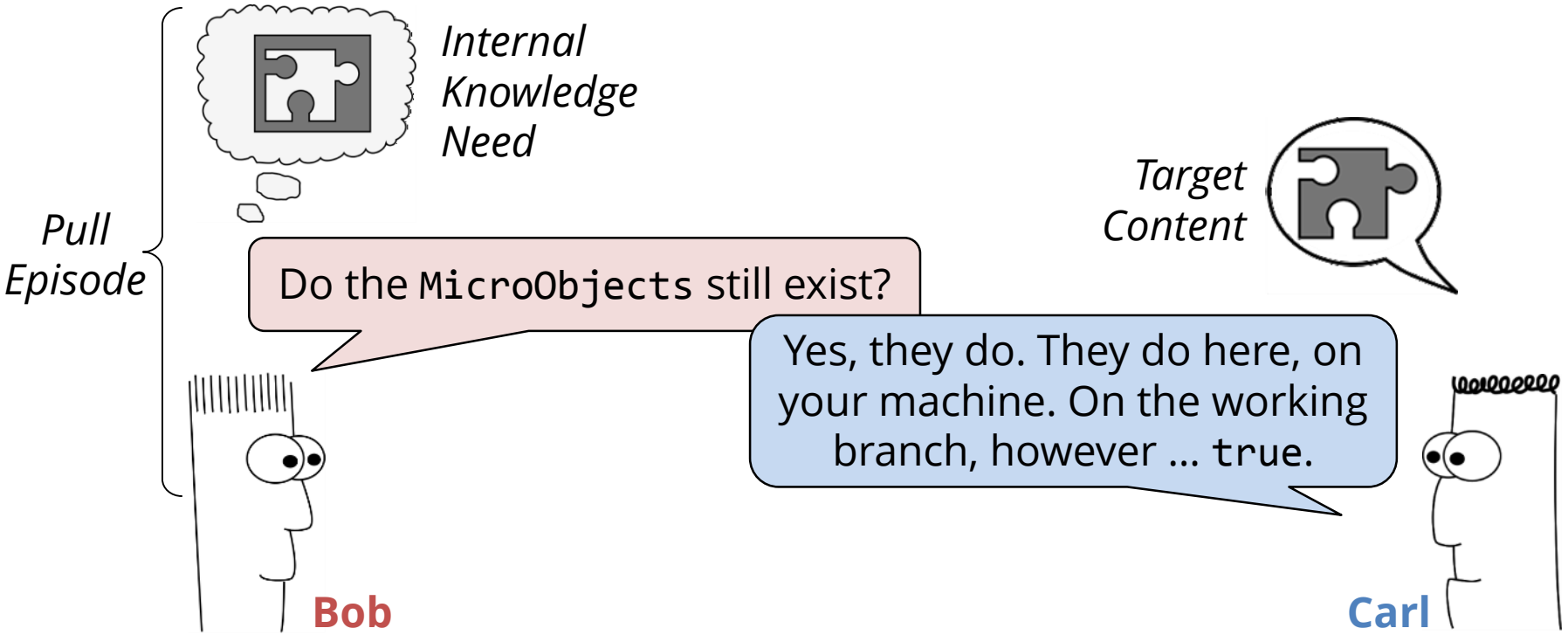

Example 2:
Effective Resynchronization

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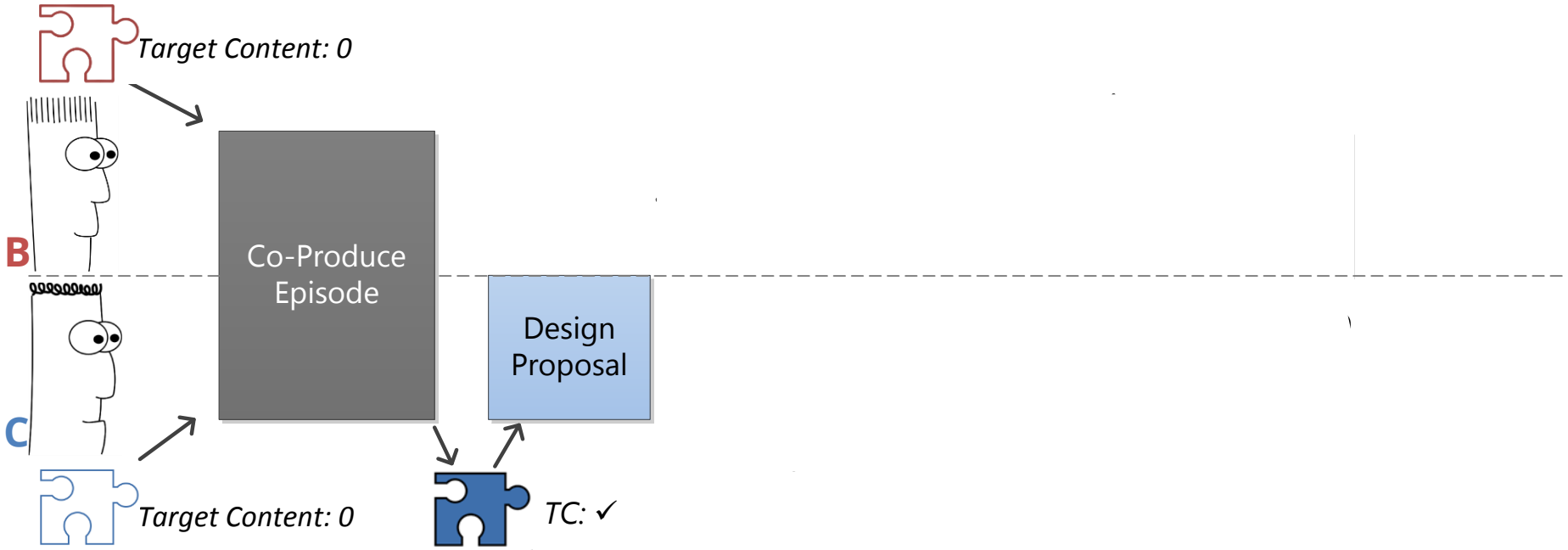

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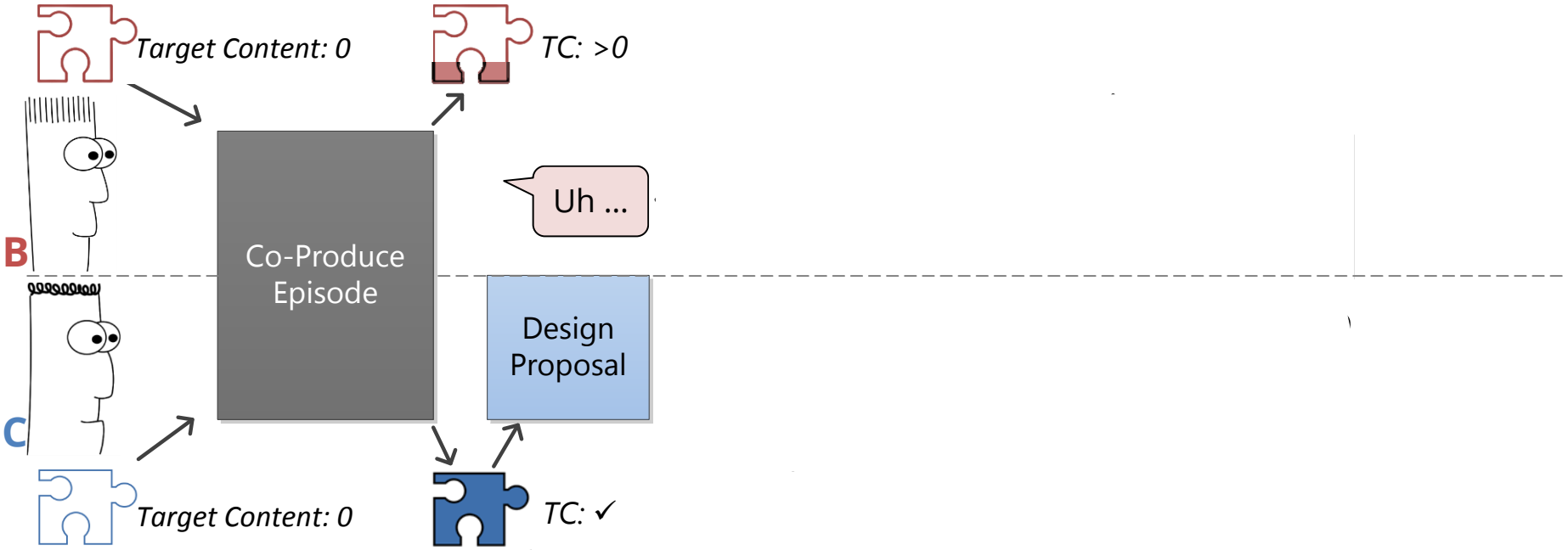

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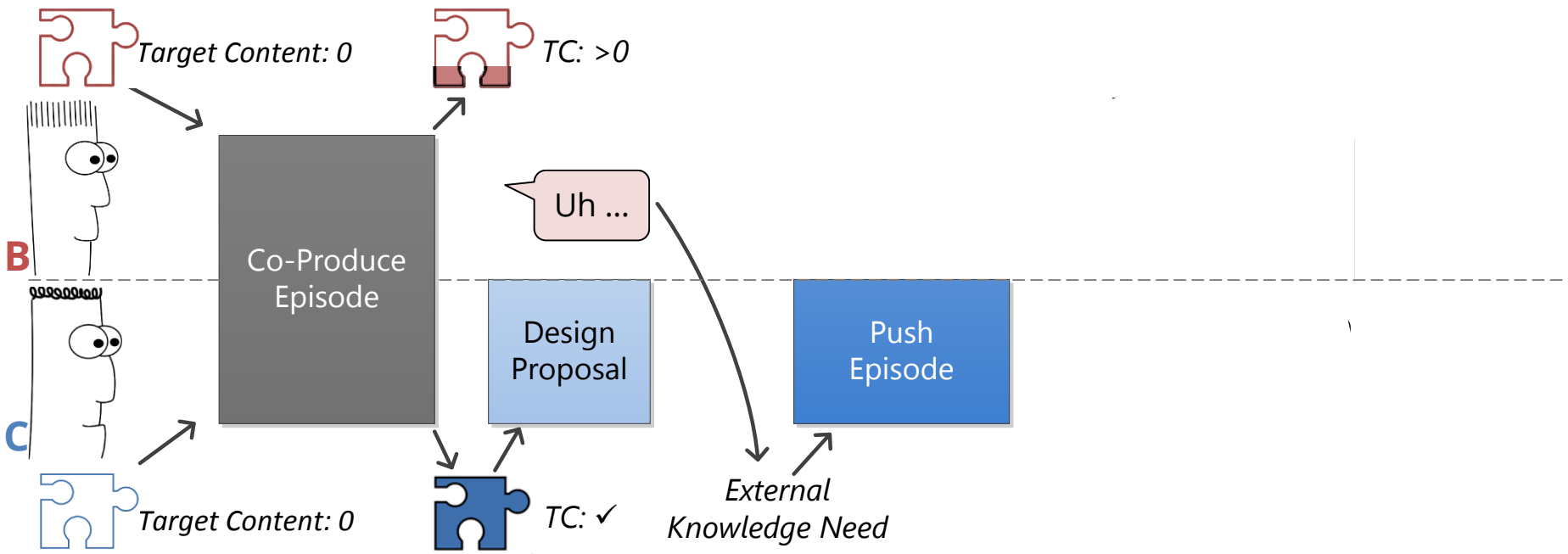

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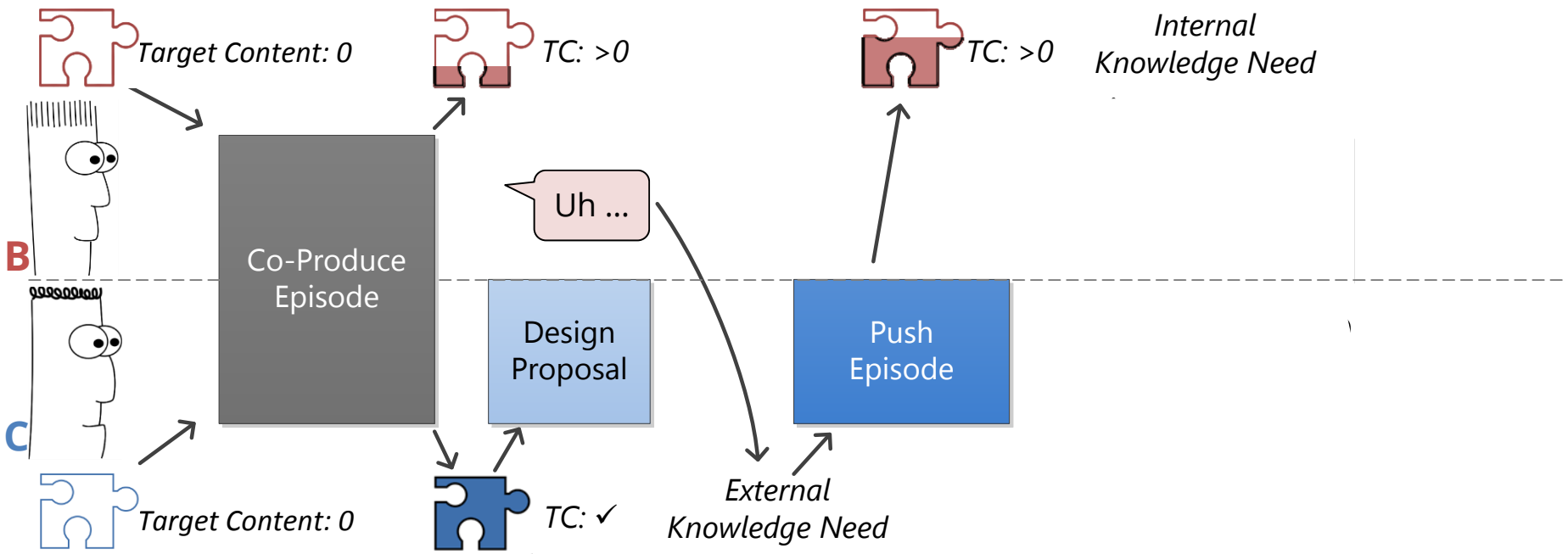

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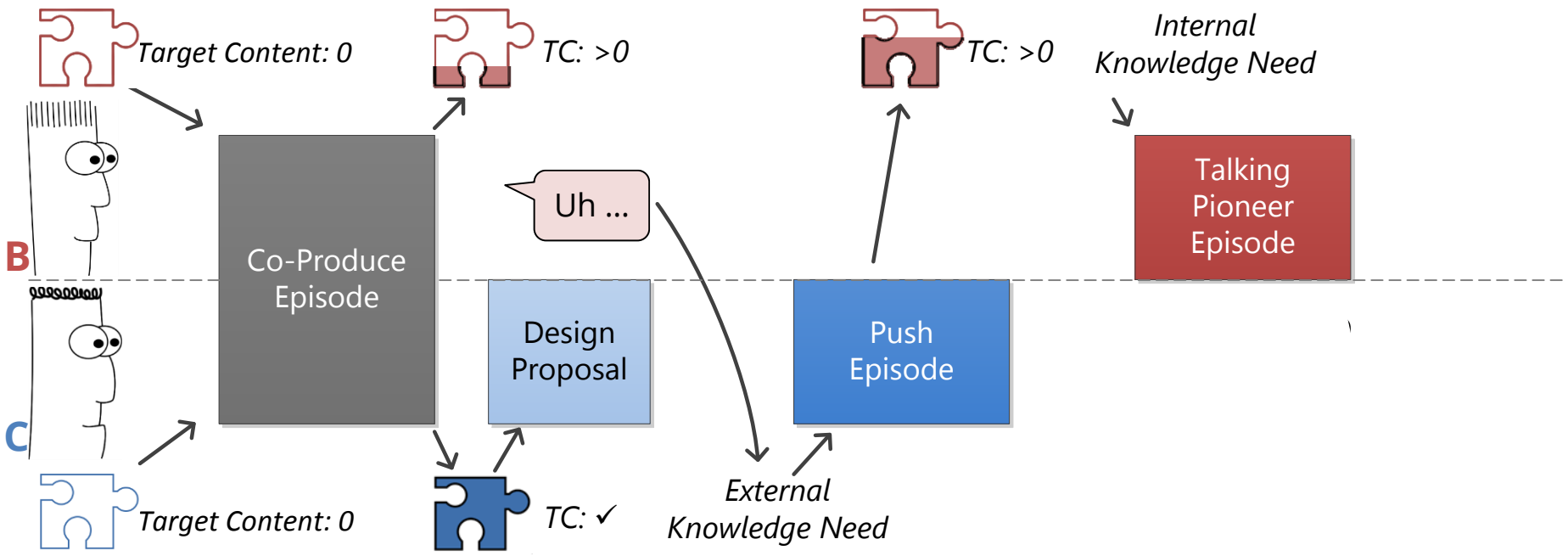
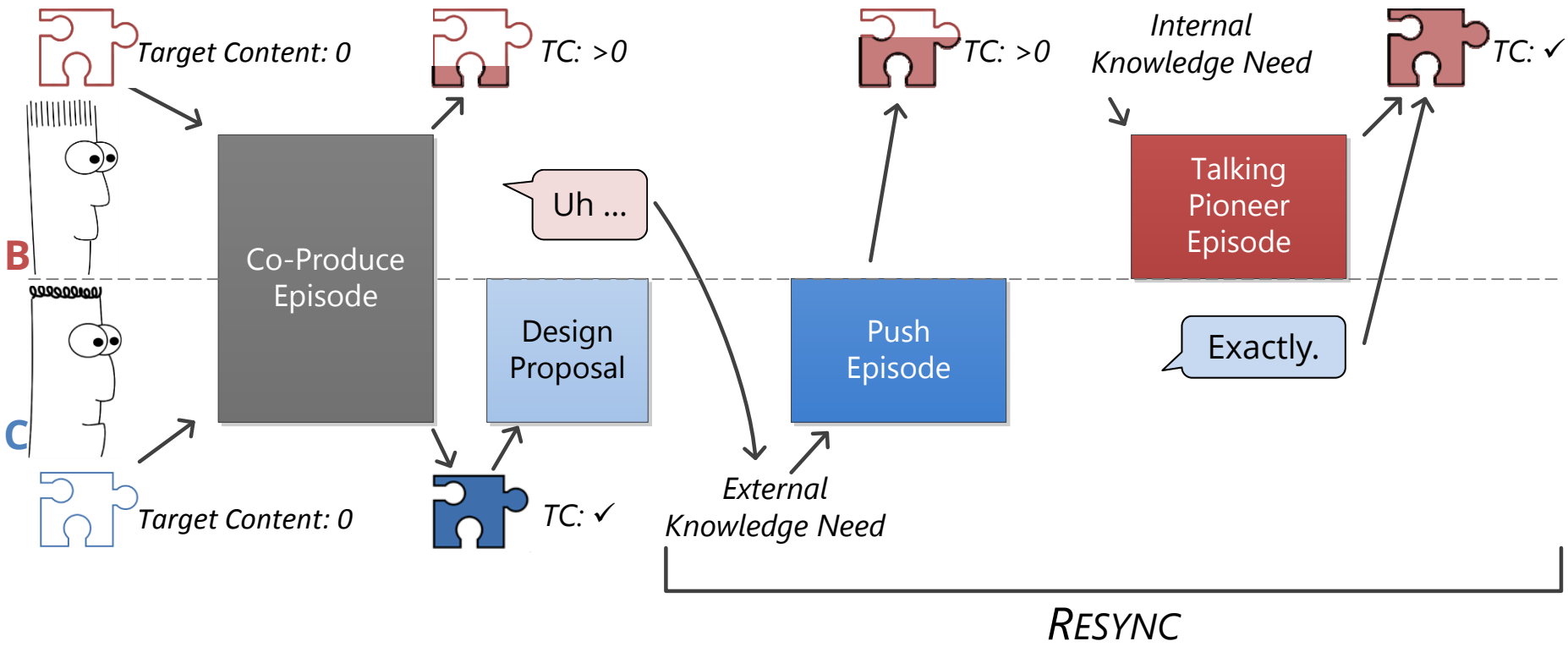
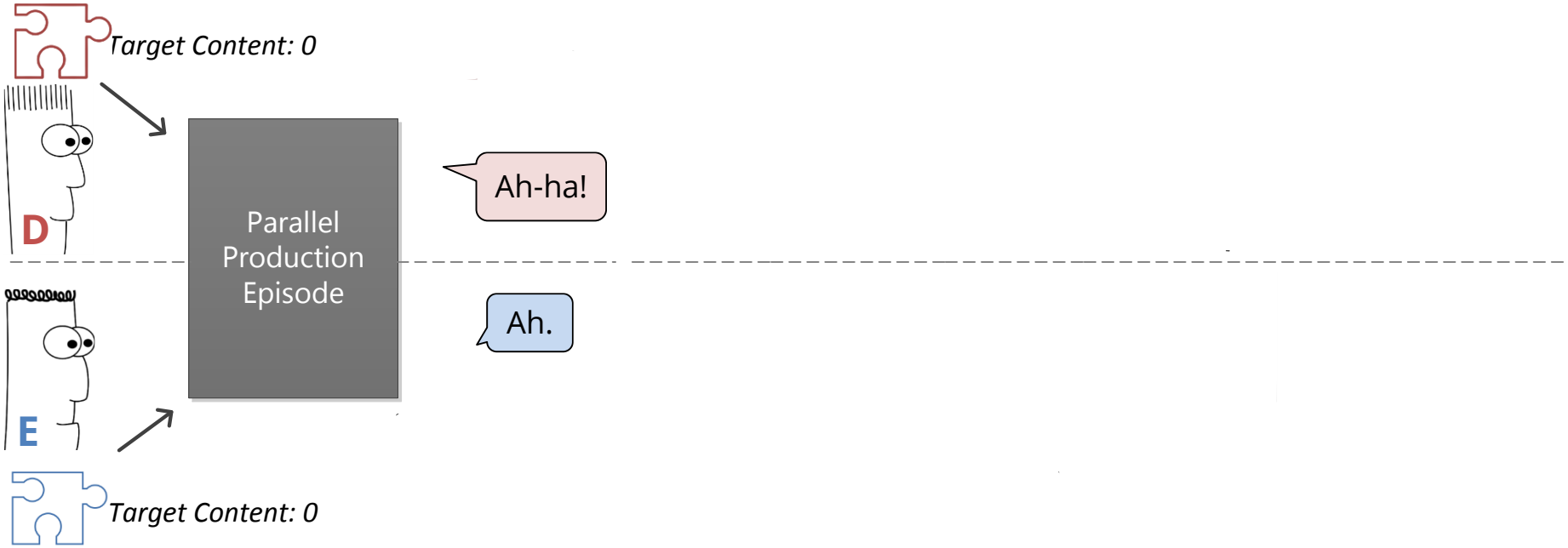


Example 2: **Effective Resynchronization**



Problematic Example 3: **Parallel Work**



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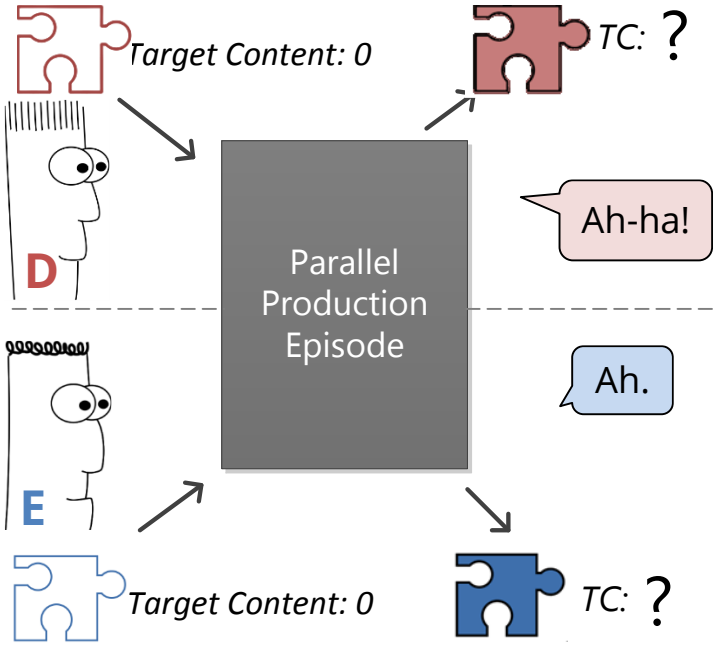

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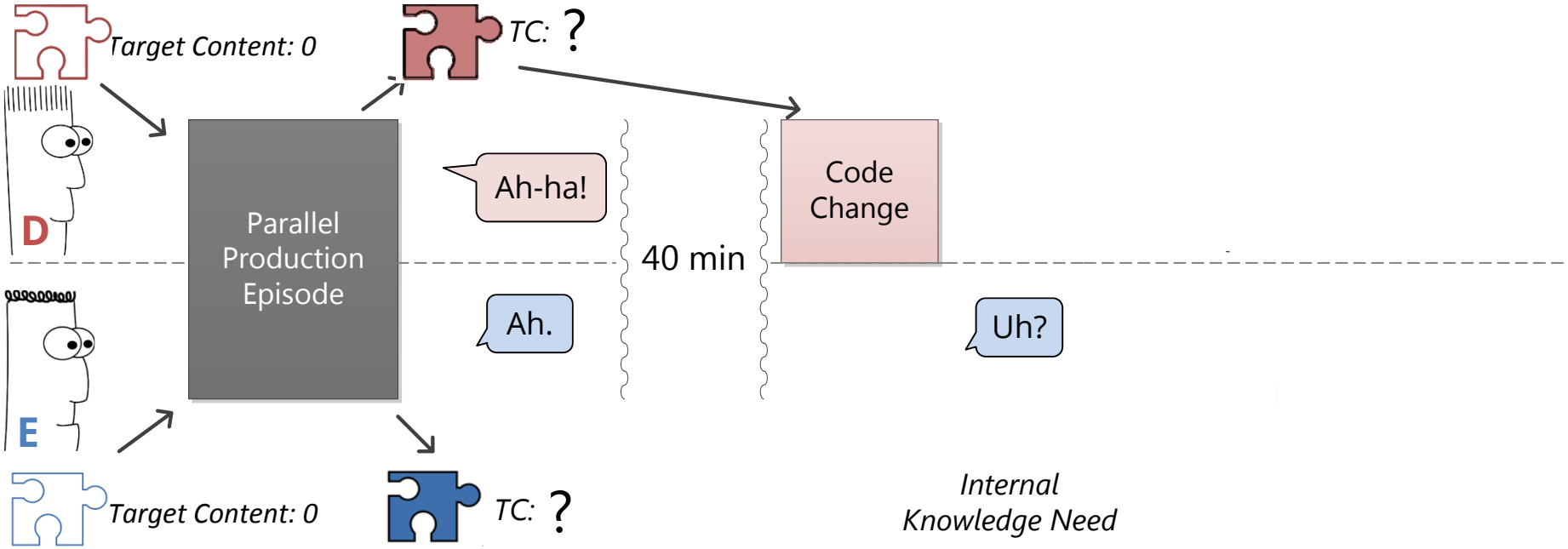

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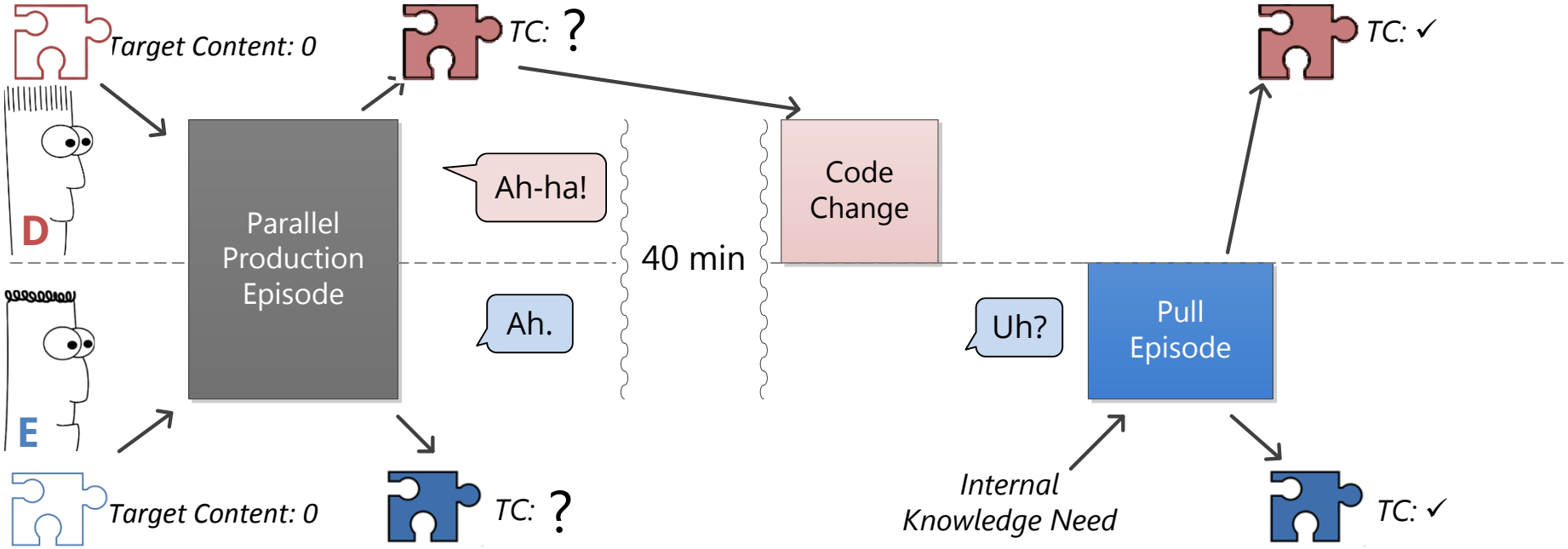

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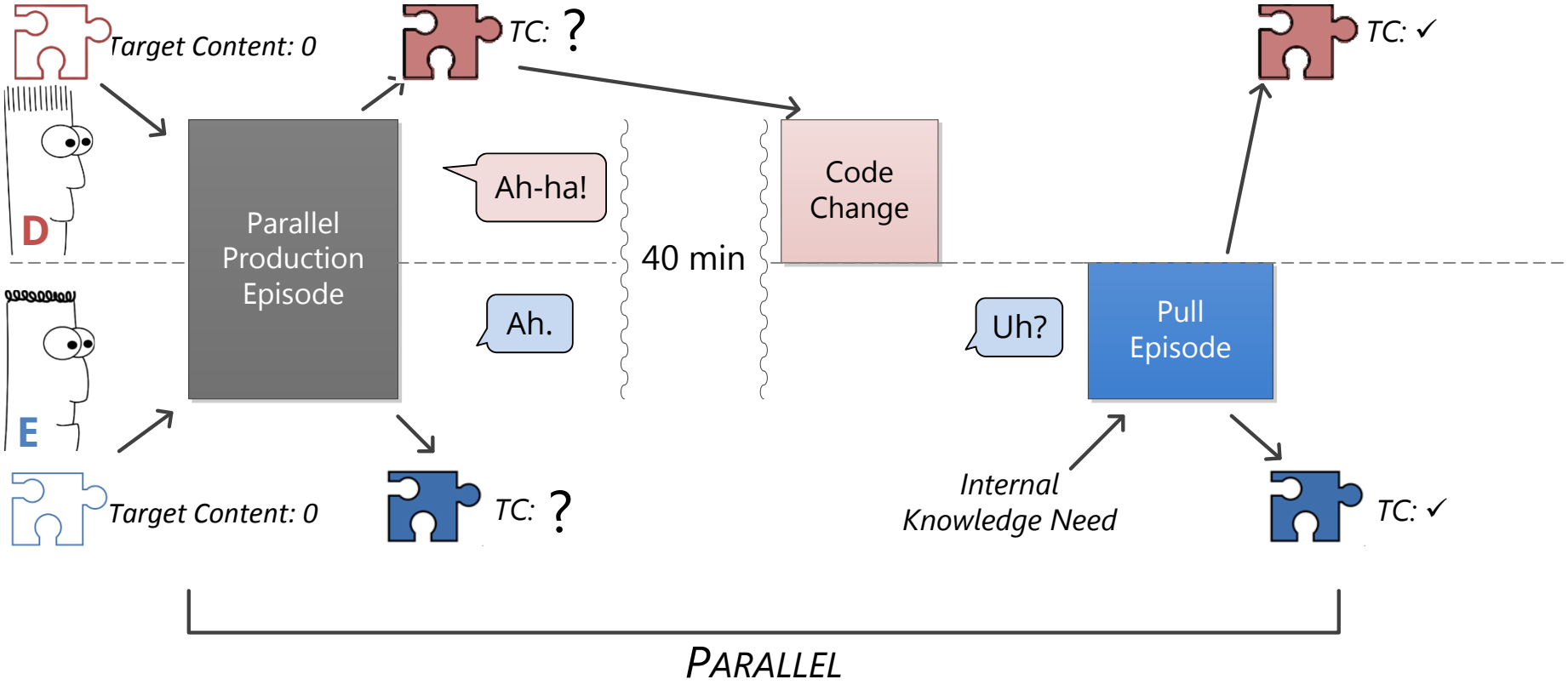


Researcher's perspective:
E's confusion makes the effects of the Parallel Production Episode visible.

Summary of the examples

- Knowledge transfer episodes **can be very efficient** (with very few utterances)
  - … if the pair **invests** in staying close together.
- If they don‘t, episodes can become much **longer** and may take **several attempts**
  - See our previous work [1]
- Even worse, the pair risks working on **parallel** tracks (as in the last example)

[1] Zieris & Prechelt, *On Knowledge Transfer Skill in Pair Programming*, in Proc. ESEM‘14

Results

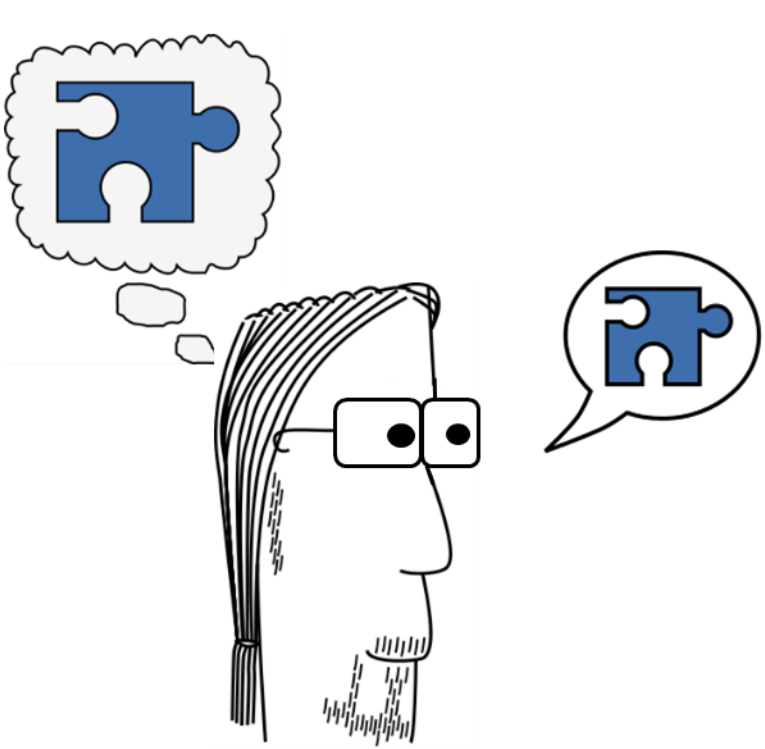
On Pair Programming in general
- No pair member more knowledgeable in all regards
- Positive effects of knowledge-wise inferior member

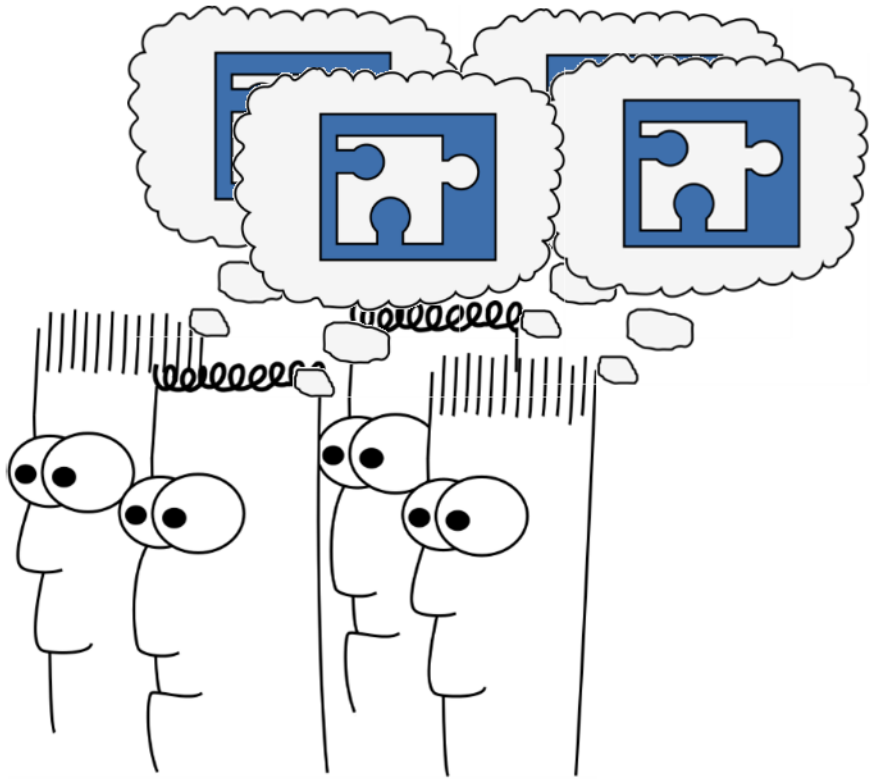
(Anti-)Pattern candidates
- Resync
- Parallel
- Talking Pioneering

See paper for in-depth examples

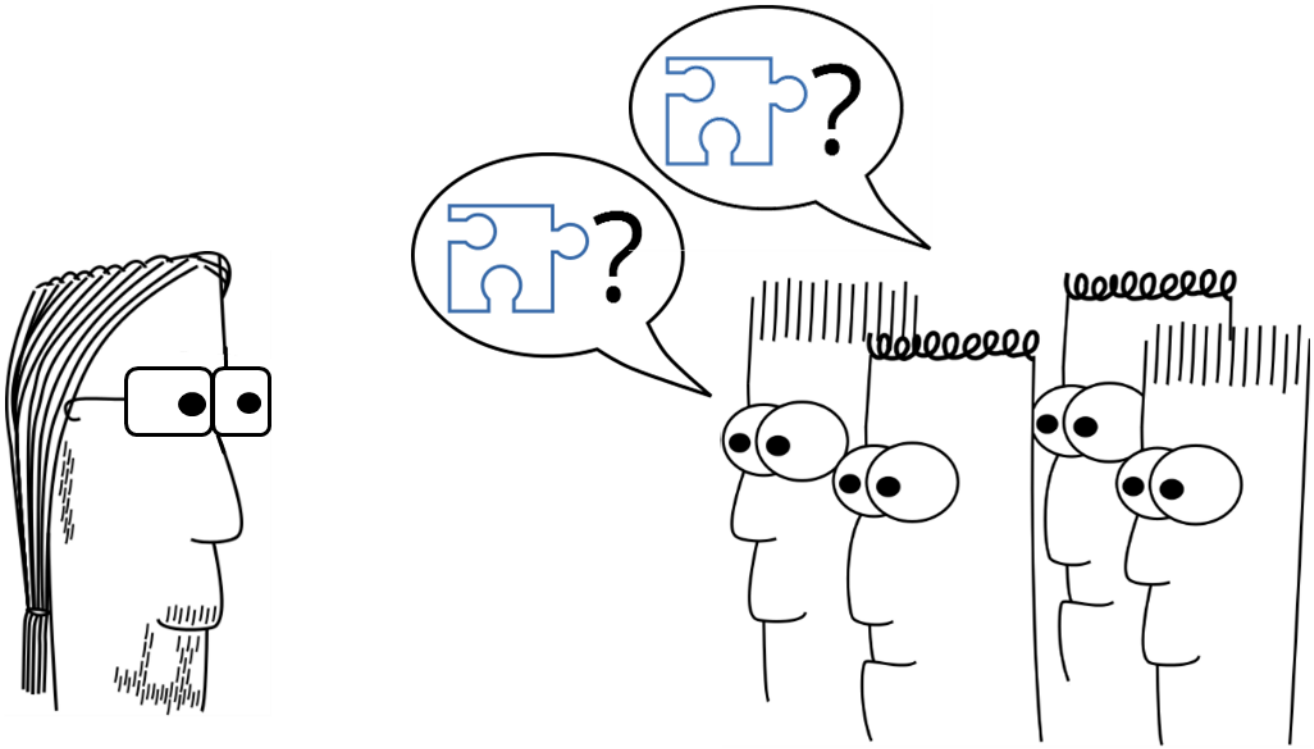
Mechanisms of knowledge transfer episodes
- Push & Pull
- Co-Produce & Pioneering Production

Enough with Push …





… time for Pull!



Thank you!

https://bitbucket.org/spooning

Used Images

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