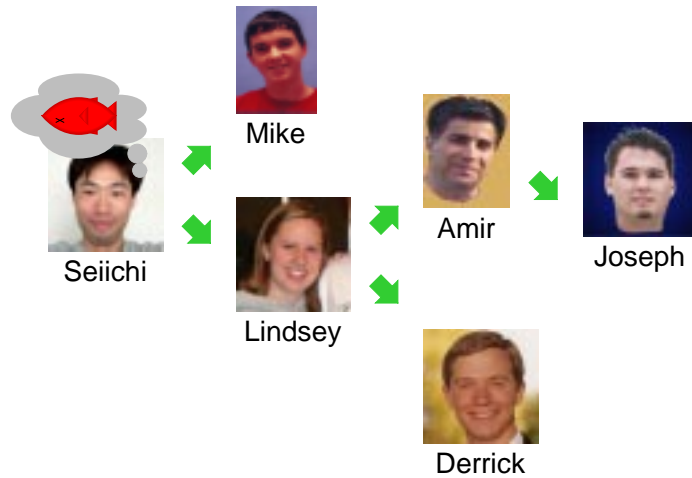


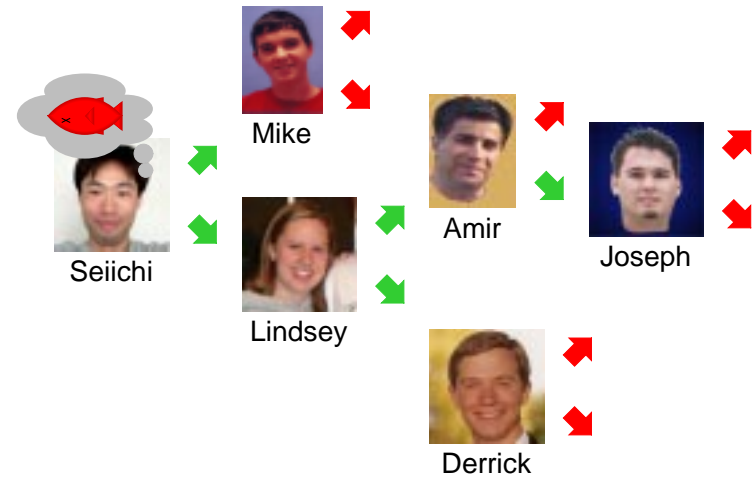
Tracking Rumors

Suppose that we want to track gossip in a rumor mill

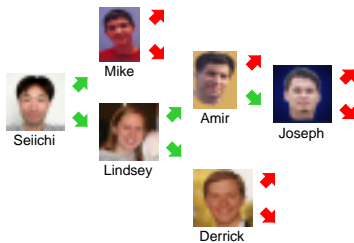


Tracking Rumors

Simplifying assumption: each person tells at most two others



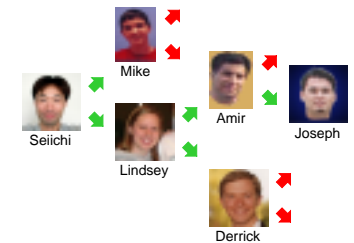
Representing Rumor Mills



Is a rumor mill simply a list of people?

No, because there are relationships among people

Representing Rumor Mills

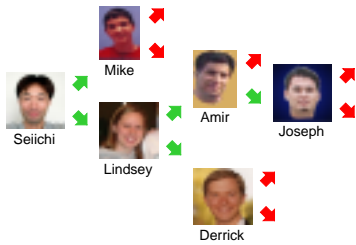


How about this?:

```
; A person is  
; (make-person image person person))
```

No, because some people don't gossip to anyone else — or they gossip to an empty rumor mill...

Representing Rumor Mills



How about this?:

```
; A rumor-mill is either  
; - empty  
; - (make-gossip image rumor-mill rumor-mill))  
(define-struct gossip (who next1 next2))
```

This looks promising...

Example Rumor Mills

```
; A rumor-mill is either  
; - empty  
; - (make-gossip image rumor-mill rumor-mill))
```

empty

Example Rumor Mills

```
; A rumor-mill is either  
; - empty  
; - (make-gossip image rumor-mill rumor-mill))
```

```
(make-gossip  empty empty)
```



Example Rumor Mills

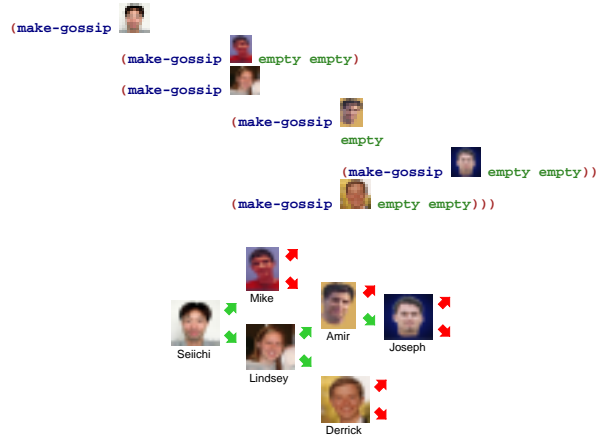
```
; A rumor-mill is either  
; - empty  
; - (make-gossip image rumor-mill rumor-mill))
```

```
(make-gossip  empty  
(make-gossip  empty empty))
```



Example Rumor Mills

```
; A rumor-mill is either
; - empty
; - (make-gossip image rumor-mill rumor-mill))
```



Example Using Abbreviations

```
(define joseph-mill
  (make-gossip image1 empty empty))

(define amir-mill
  (make-gossip image2 empty joseph-mill))

(define derrick-mill
  (make-gossip image3 empty empty))

(define lindsey-mill
  (make-gossip image4 amir-mill derrick-mill))

(define mike-mill
  (make-gossip image5 empty empty))

(define seiichi-mill
  (make-gossip image6 mike-mill lindsey-mill))
```

Programming with Rumors

```
; A rumor-mill is either
; - empty
; - (make-gossip image rumor-mill rumor-mill))
```

```
(define (func-for-rumor-mill rm)
  (cond
    [(empty? rm) ...]
    [(gossip? rm)
     ... (gossip-who rm)
     ... (func-for-rumor-mill (gossip-next1 rm))
     ... (func-for-rumor-mill (gossip-next2 rm)) ...]))
```

Rumor Program Examples

- Implement the function **informed?** which takes a person image and a rumor mill and determines whether the person is part of the rumor mill
- Implement **rumor-delay** which takes a rumor mill and determines the maximum number of days required for a rumor to reach everyone, assuming that each person waits a day before passing on a rumor
- Implement **add-gossip** which takes a rumor mill and two person images — one new and one old — and adds the new person to the rumor mill, receiving rumors from the old person; the old person must not already have two next persons
- Implement **rumor-chain** which takes a person image and a rumor mill and returns a list of person images representing everyone who must pass on the rumor for it to reach the given person; return **false** if the given person is never informed

More Pipes

- In the Mid-Term I example, we had all straight pipes in a pipeline
- Real pipes end in faucets (open or closed) and sometimes branch



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```
; A pipeline is either  
; - bool  
; - (make-straight sym pipeline)  
; - (make-branch pipeline pipeline)  
(define-struct straight (kind next))  
(define-struct branch (next1 next2))
```

Example Pipelines

```
; A pipeline is either  
; - bool  
; - (make-straight sym pipeline)  
; - (make-branch pipeline pipeline)
```

false



Example Pipelines

```
; A pipeline is either  
; - bool  
; - (make-straight sym pipeline)  
; - (make-branch pipeline pipeline)
```

true



Example Pipelines

```
; A pipeline is either  
; - bool  
; - (make-straight sym pipeline)  
; - (make-branch pipeline pipeline)
```

```
(make-straight 'copper false)
```



Example Pipelines

```
; A pipeline is either  
; - bool  
; - (make-straight sym pipeline)  
; - (make-branch pipeline pipeline)
```

```
(make-straight 'copper  
  (make-straight 'lead false))
```



Example Pipelines

```
; A pipeline is either  
; - bool  
; - (make-straight sym pipeline)  
; - (make-branch pipeline pipeline)
```

```
(make-branch  
  (make-branch (make-straight 'copper true)  
               false)  
  (make-branch false  
               false))
```



Programming with Pipelines

```
; A pipeline is either  
; - bool  
; - (make-straight sym pipeline)  
; - (make-branch pipeline pipeline)
```

```
(define (func-for-pipeline pl)  
  (cond  
    [(boolean? pl) ...]  
    [(straight? pl)  
     ... (straight-kind pl)  
     ... (func-for-pipeline (straight-next pl)) ...]  
    [(branch? pl)  
     ... (func-for-pipeline (branch-next1 pl))  
     ... (func-for-pipeline (branch-next2 pl)) ...]))
```

Pipeline Examples

- Implement the function **water-running?** which takes a pipeline and determines whether any faucets are open
- Implement the function **modernize** which takes a pipeline and converts all 'lead straight pipes to 'copper
- Implement the function **off** which takes a pipeline and turns off all the faucets
- Implement the function **lead-off** which takes a pipeline and turns off all the faucets that receive water through a lead pipe
- Implement the function **twice-as-long** which takes a pipeline and inserts a 'copper straight pipe before every existing piece of the pipeline