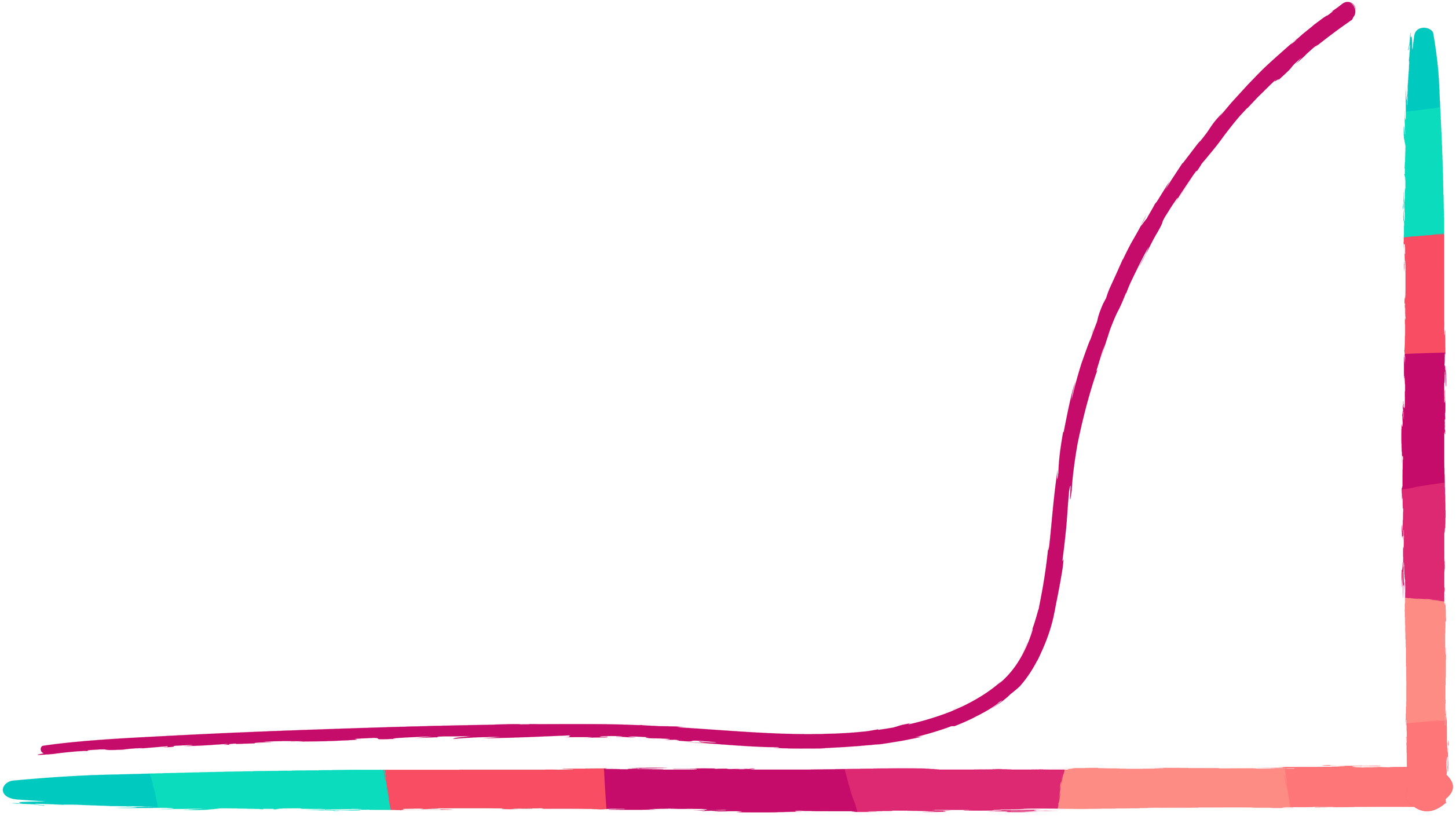
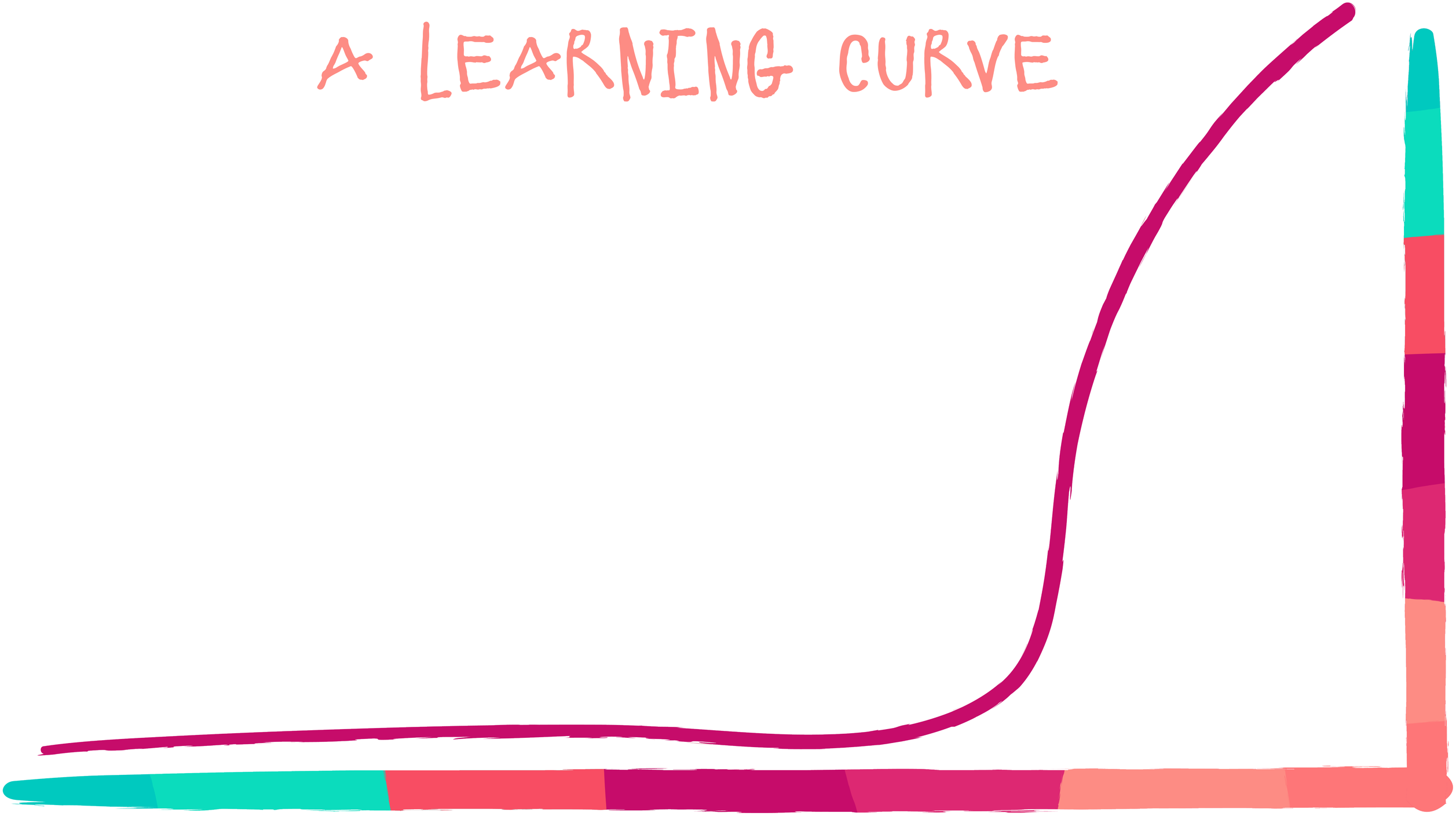
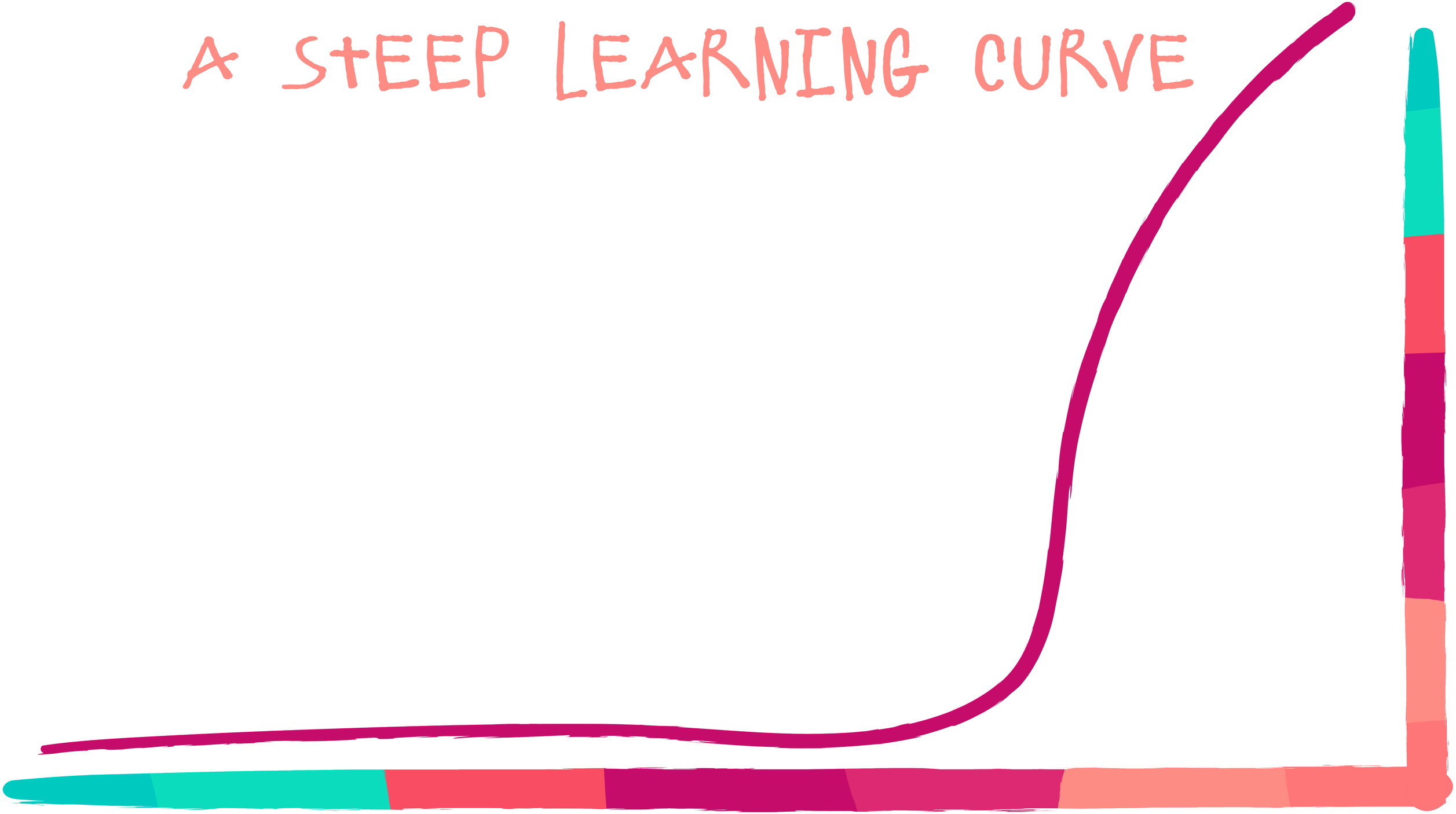


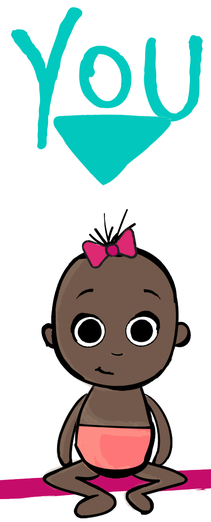
A LEARNING CURVE



A STEEP LEARNING CURVE



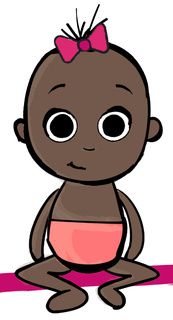
A STEEP LEARNING CURVE



A STEEP LEARNING CURVE

SUPERSTAR

YOU



A STEEP LEARNING CURVE

SUPERSTAR

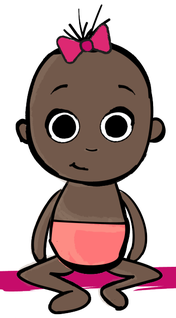
YOU

A STEEP LEARNING CURVE

SUPERSTAR

ME

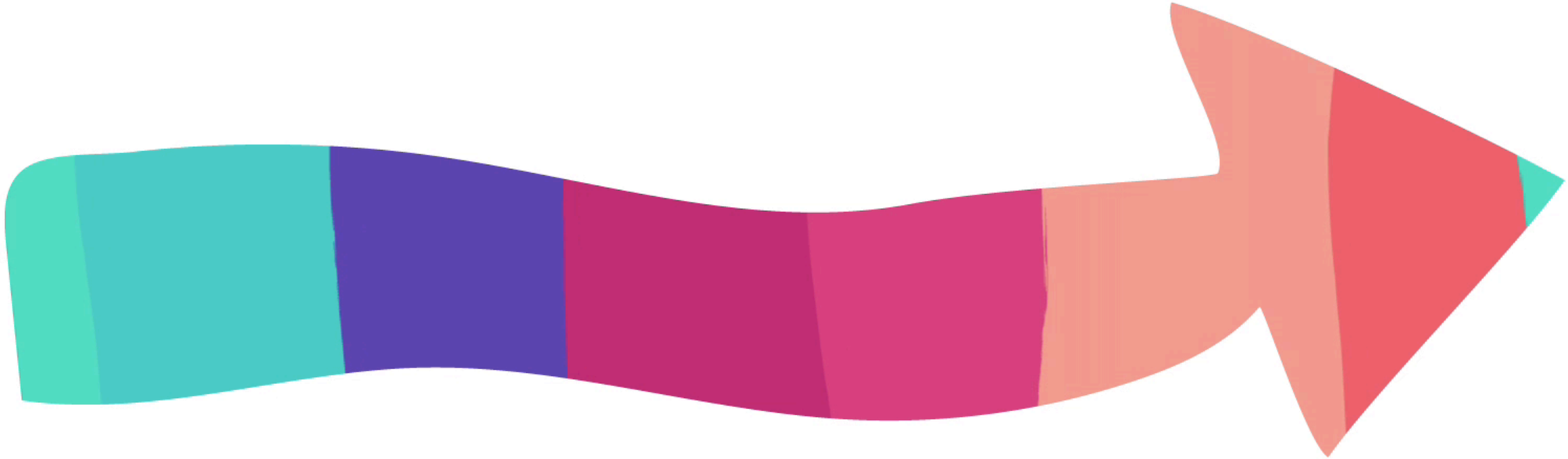
YOU



RXJAVA IN BABY STEPS

@BRWNGRLDEV

ASYNCHRONOUS DATA STREAMS



CLICK EVENTS

PUSH NOTIFICATIONS

KEYBOARD INPUT

READING A FILE

DATABASE ACCESS

DEVICE SENSOR UPDATES


GPS UPDATES
TIME

GPS UPDATES

TIME

-36.34543, 3.23445

GPS UPDATES

TIME

-36.34543, 3.23445

-36.24543, 3.23425

GPS UPDATES

TIME

-36.34543, 3.23445

-36.24543, 3.23425

-35.34543, 3.13445


SERVER RESPONSE
TIME

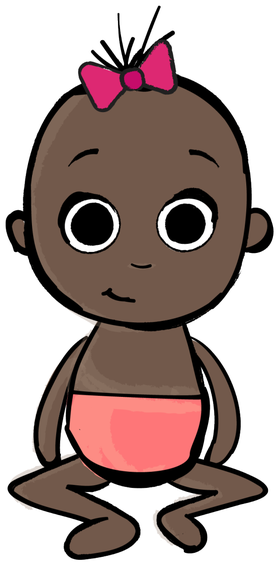
SERVER RESPONSE

TIME

SERVER RESPONSE

toys

TIME

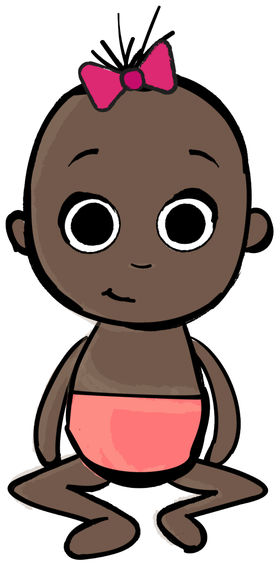


SERVER RESPONSE

TIME

SERVER RESPONSE

TIME



WHICH OF THE FOLLOWING IS AN ASYNCHRONOUS DATA STREAM?

- A: CLICK EVENTS
- B: DATABASE ACCESS
- C: SERVER RESPONSE
- D: ALL OF THE ABOVE

WHICH OF THE FOLLOWING IS AN ASYNCHRONOUS DATA STREAM?

- A: CLICK EVENTS
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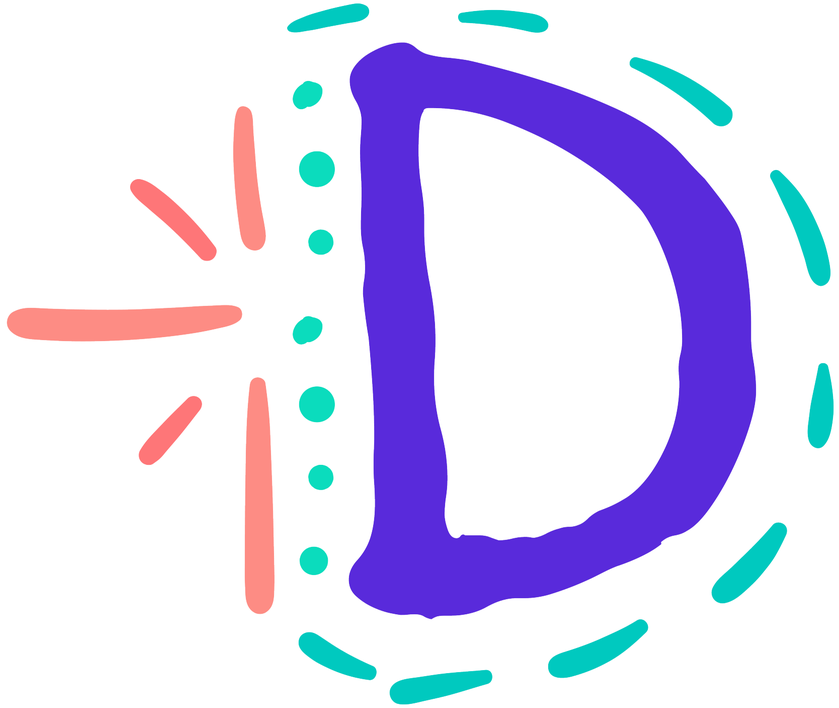
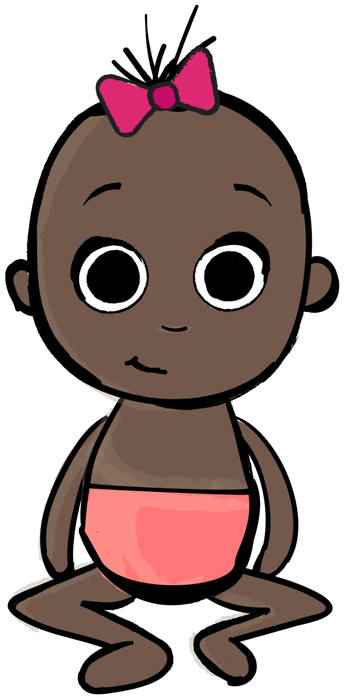



WHY?



SCIENTIFIC RESEARCH

SCIENTIFIC RESEARCH


Following
Lucia
@LuciaP_86
Replying to @brwngrldev
Readability, higher level of abstraction, async
Ben Oberkfell
@benlikestocode
Replying to @brwngrldev
It saved my soul from c
Robert Anizoba
@bobtinkernaut
Replying to @brwngrldev @moyheen
Follow
Make multiple api calls in parallel (thank you
'zip'), threading made easy, operators to
transform/filter data
Eric Cochran
@Eric_Cochran
Replying to @brwngrldev @yogurtearl
FP: The predictability of functional
programming is what we prog
already strive for.
Perfect
@Perfect
Replying to @brwngrldev
Functional style, Thread management,
testability...
Matt Clarke
@kiwiandroiddev
Replying to @brwngrldev
Following
I've found it makes it easier to
follow/visualise a sequence of async
operations making it easier to adapt it or
spot errors
Yuliya Kaleda
@YuliyaKaleda
Following
Replying to @brwngrldev
Convenient data processing though various
chain operators

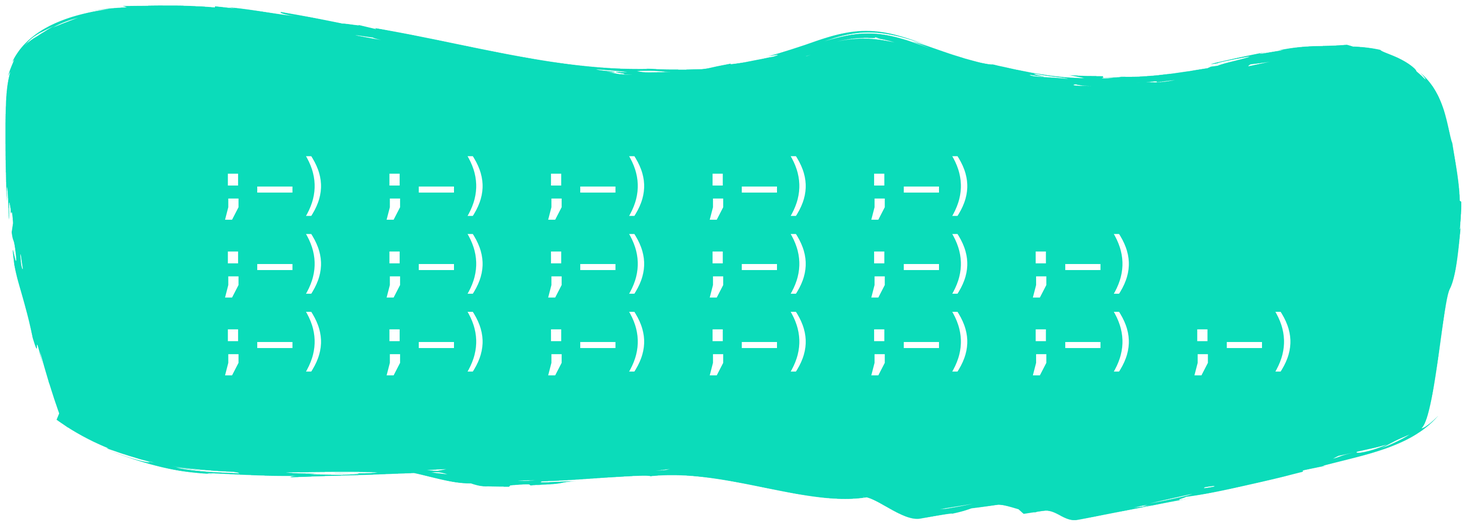

CHAINING
THREADING
COMPOSABLE
ABSTRACTION
NON-
BLOCKING
AVOID
CALLBACKS
DATA
TRANSFORMATION

DATA TRANSFORMATION

```
Observable.just(5, 6, 7)
        .map { ";-) ".repeat(it) }
        .subscribe { println(it) }
```

DATA TRANSFORMATION

```
Observable.just(5, 6, 7)
          .map { ";-) ".repeat(it) }
          .subscribe { println(it) }
```

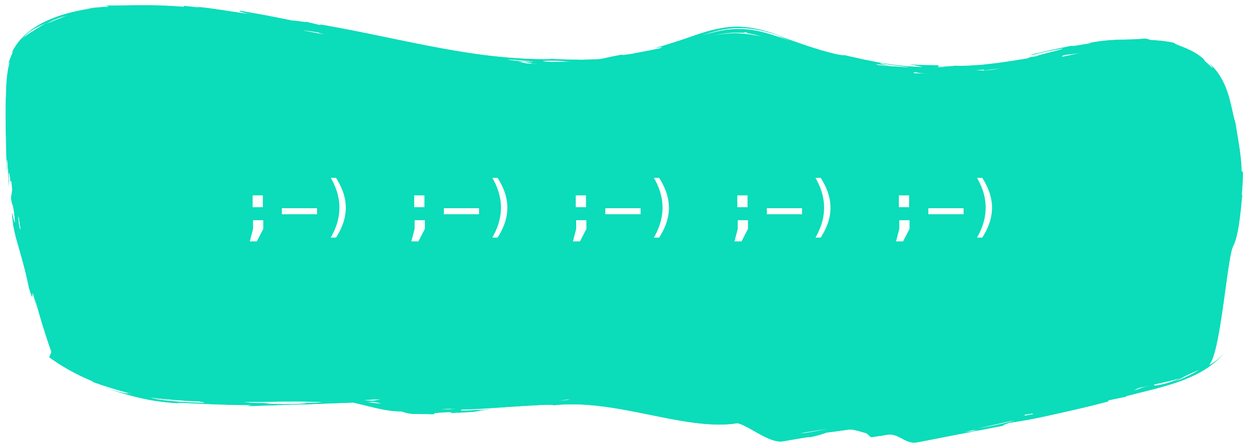


CHAINING

```
Observable.just(5, 6, 7)
          .map { ";-) ".repeat(it) }
          .filter { it.length < 24 }
          .subscribe { println(it) }
```

CHAINING

```
Observable.just(5, 6, 7)
          .map { ";-) ".repeat(it) }
          .filter { it.length < 24 }
          .subscribe { println(it) }
```



ABSTRACTION

```kotlin
@Test
fun transformWithMap() {
    Observable.just( item1: 5,  item2: 6,  item3: 7)
            .map { ";-) ".repeat(it) }
            .filter { it.length < 24 }
            .subscribe { println(it) }
}
```

RXJAVA IS...?

- A: THE SILVER BULLET
- B: SIMPLY MAGIC
- C: PURE VOODOO
- D: A LIBRARY

RXJAVA IS...?

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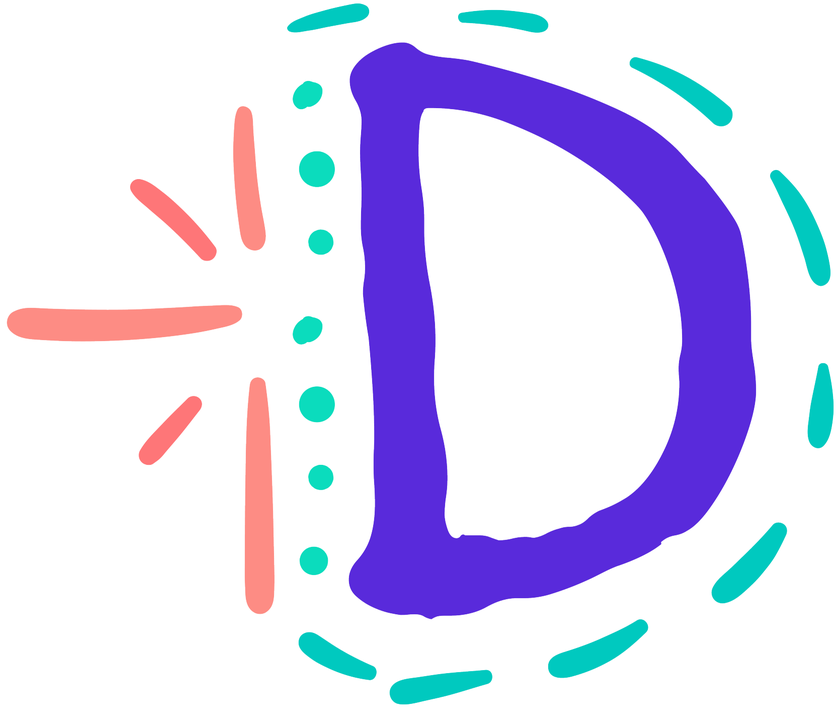
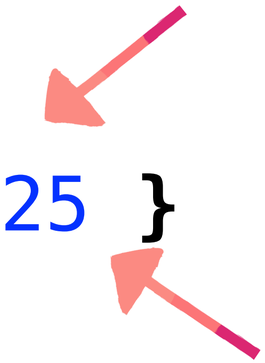
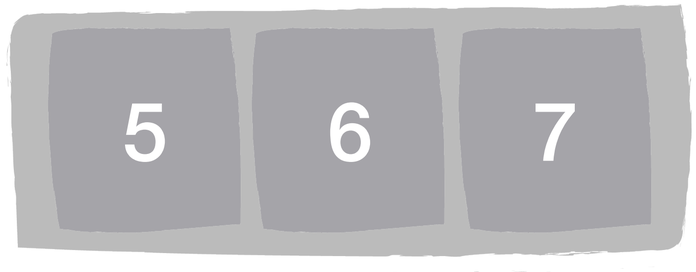


KotLIN COLLECTIONS

```
listOf(5, 6, 7)
    .map { it * 5 }
    .filter { it > 25 }
```



Kotlin collections




```
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```

Kotlin collections

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listOf(5, 6, 7)
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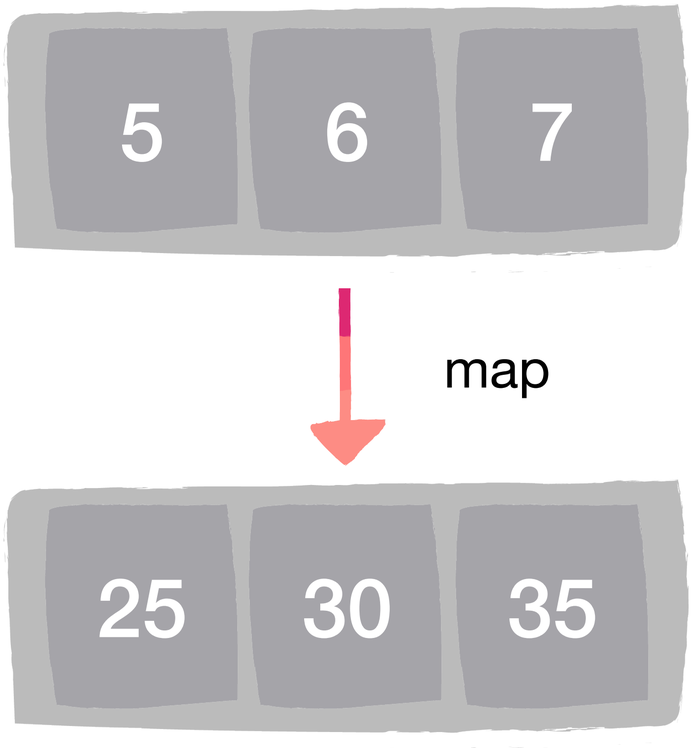
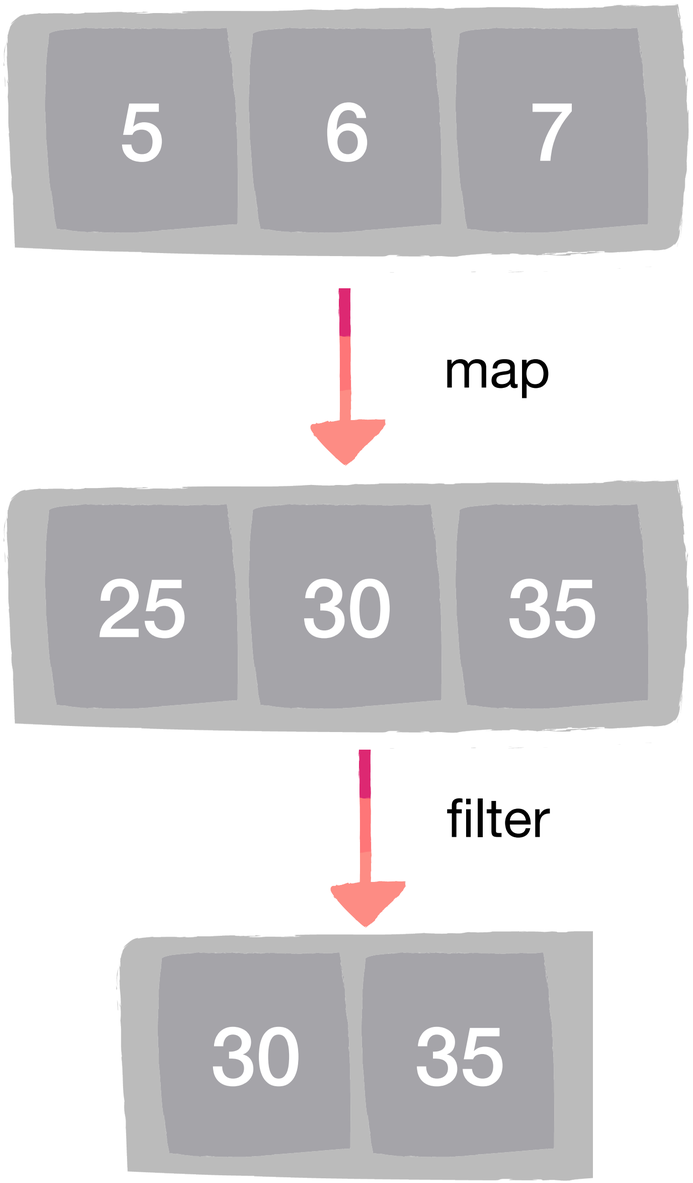


Kotlin collections

```
listOf(5, 6, 7)
    .map { it * 5 }
    .filter { it > 25 }
```



LAZY

KotLIN SEQUENCES

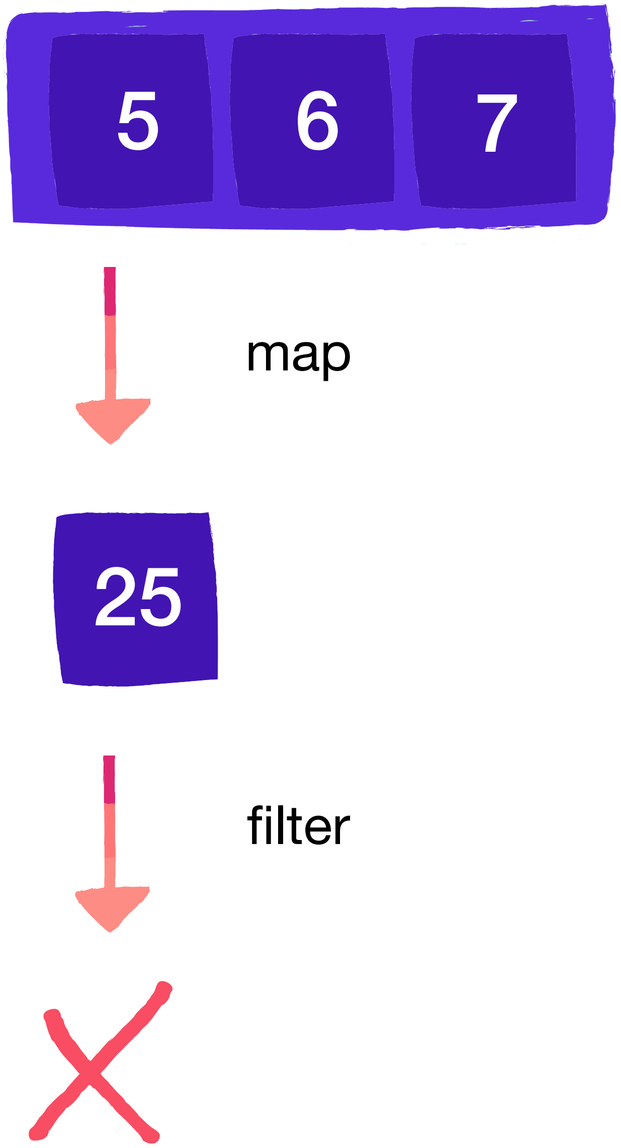
```
listOf(5, 6, 7)
    .asSequence()
    .map { it * 5 }
    .filter { it > 25 }
    .toList()
```

KotLIN SEQUENCES


```
listOf(5, 6, 7)
    .asSequence()
    .map { it * 5 }
    .filter { it > 25 }
    .toList()
```

Kotlin sequences

```
listOf(5, 6, 7)
    .asSequence()
    .map { it * 5 }
    .filter { it > 25 }
    .toList()
```



KotLIN SEQUENCES

```
listOf(5, 6, 7)
    .asSequence()
    .map { it * 5 }
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```

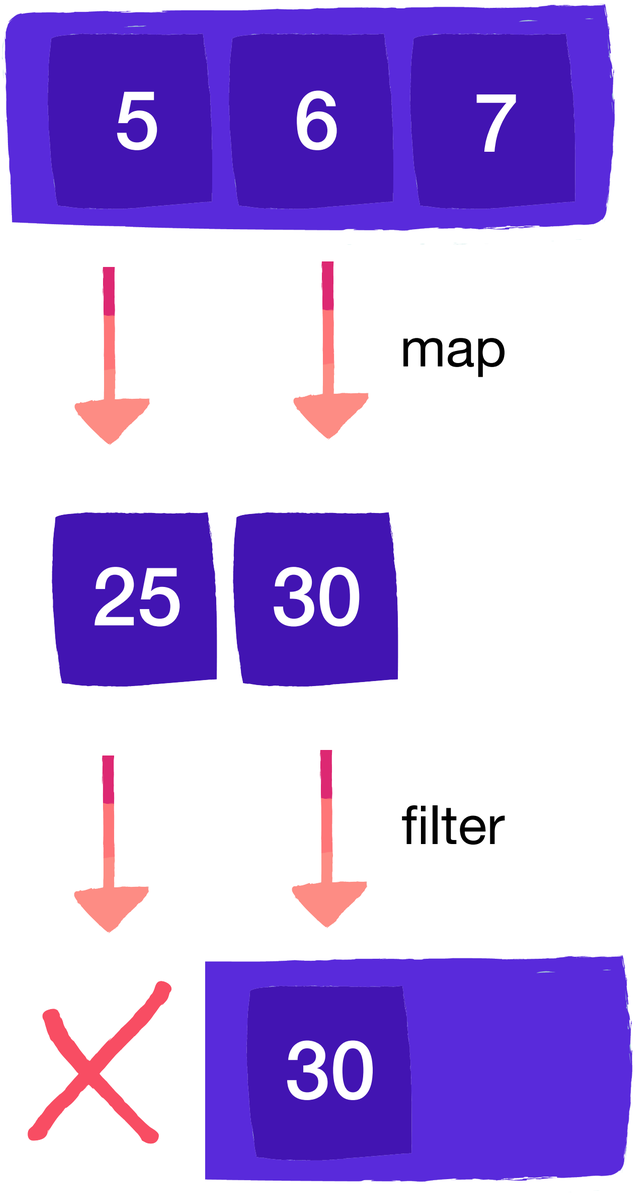

KotLIN SEQUENCES

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listOf(5, 6, 7)
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        .map { it * 5 }
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        .toList()
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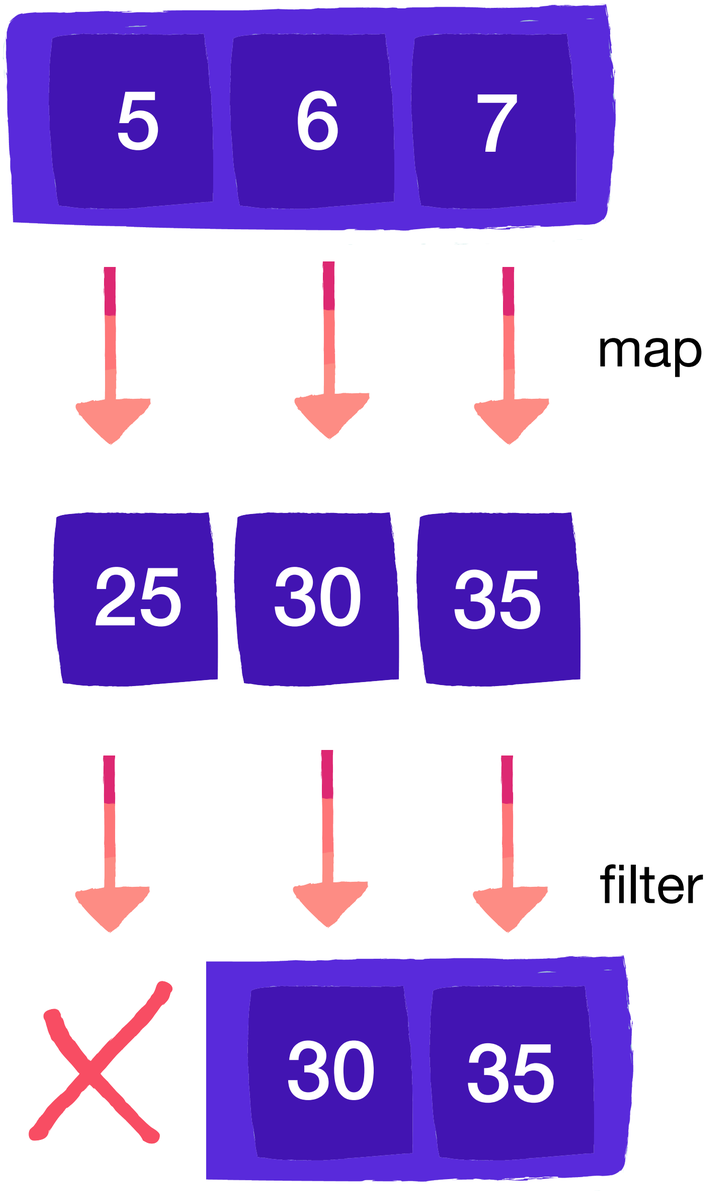
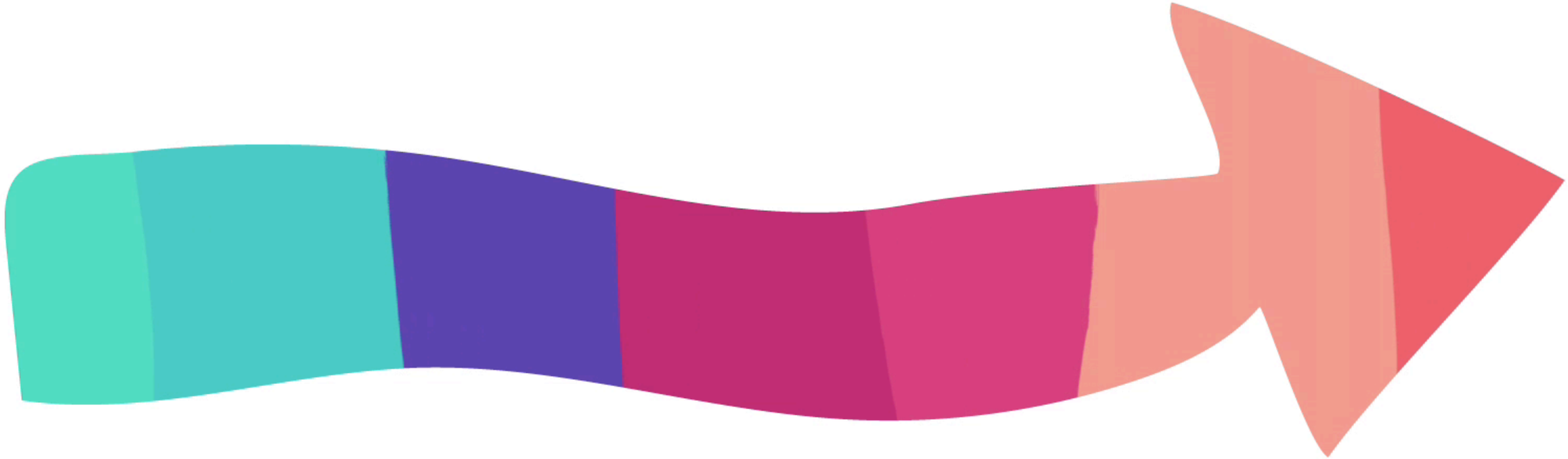



WHY?

ASYNCHRONOUS DATA STREAMS



RXJAVA

```
numbers
        .map { it * 5 }
        .filter { it > 25 }
        .subscribe()
```

RXJAVA

```
numbers
        .map { it * 5 }
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        .subscribe()
```
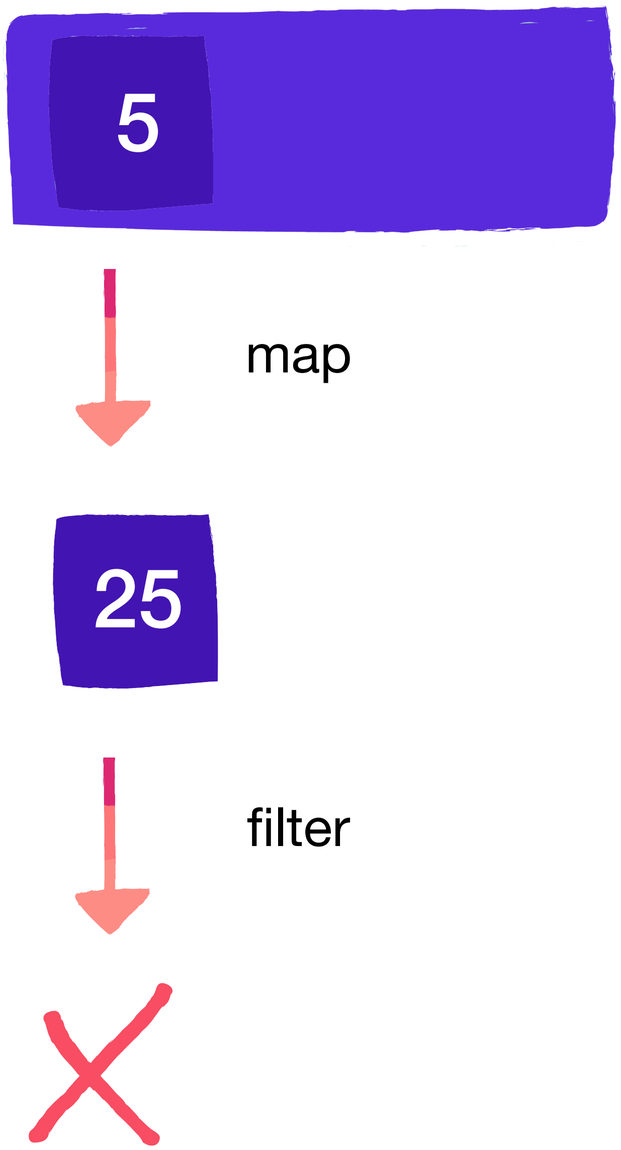
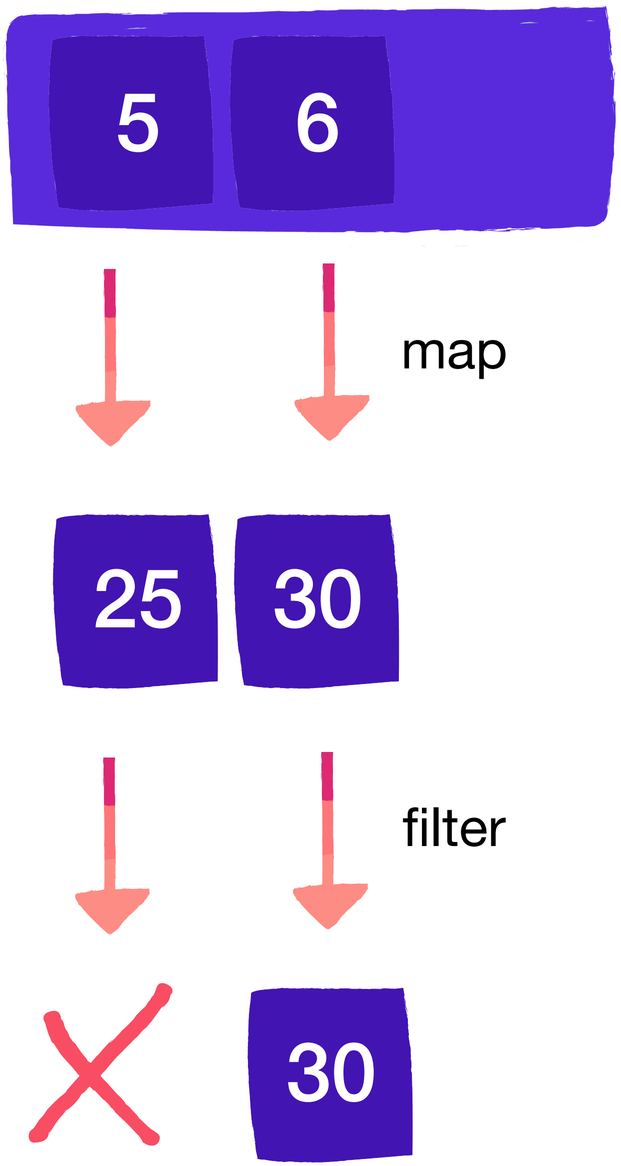



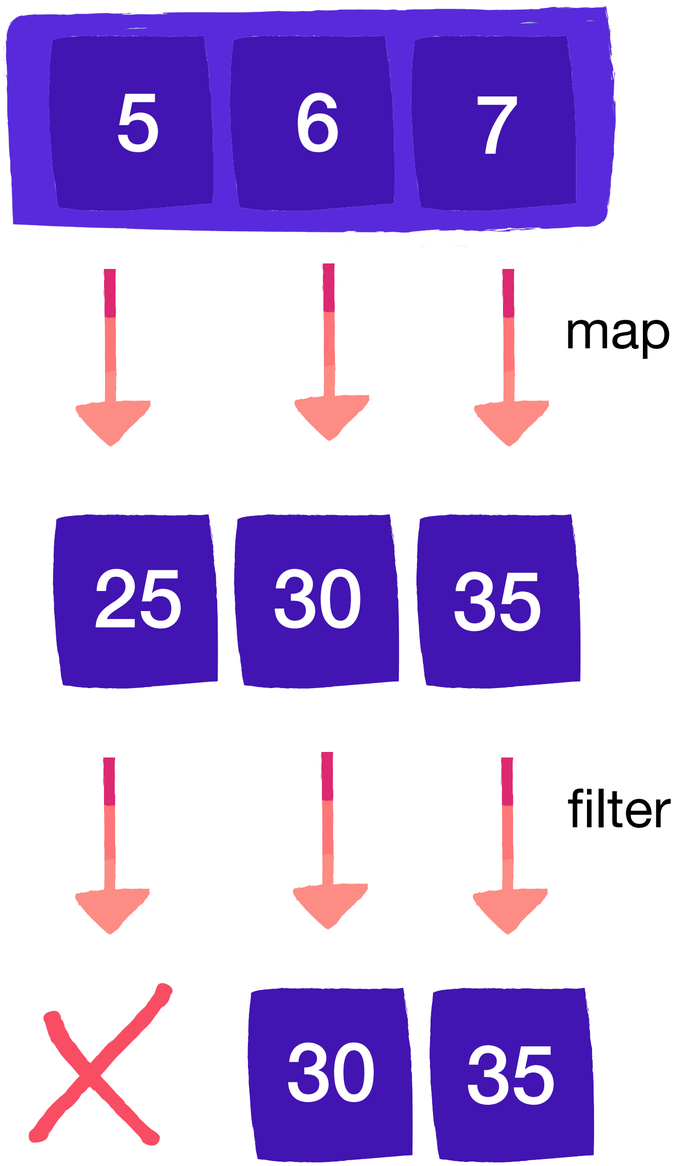
RXJAVA

```
numbers
        .map { it * 5 }
        .filter { it > 25 }
        .subscribe()
```



RXJAVA

```
numbers
        .map { it * 5 }
        .filter { it > 25 }
        .subscribe()
```

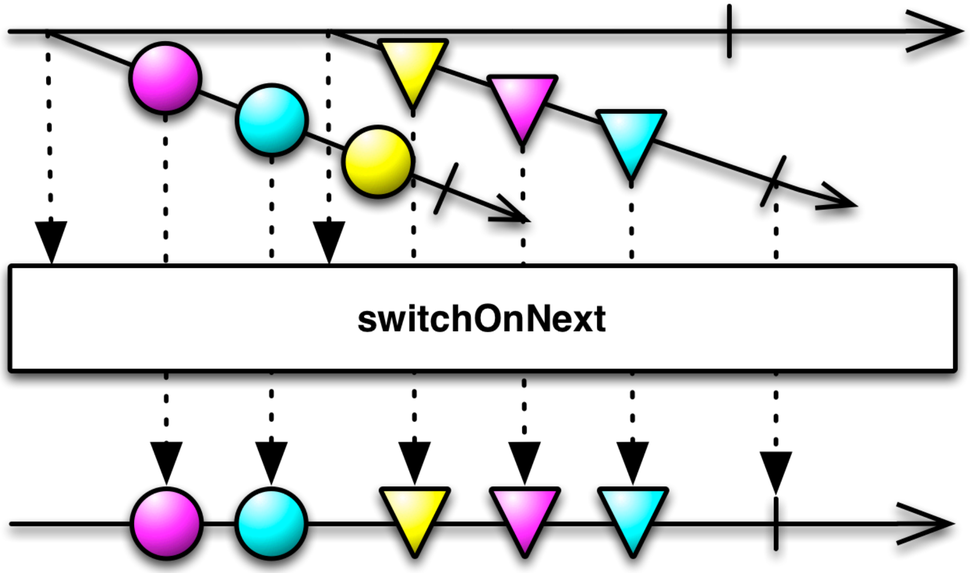


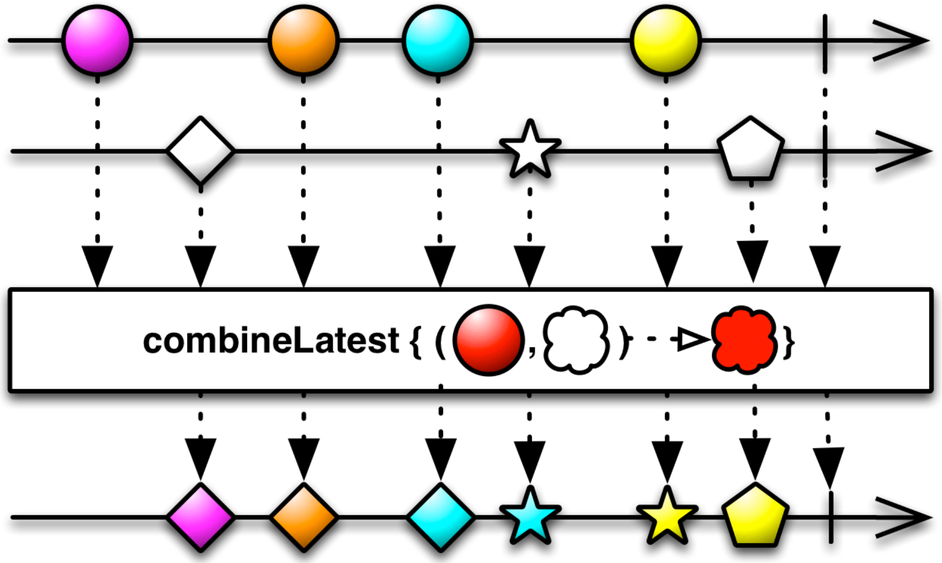
FLEXIBLE THREADING

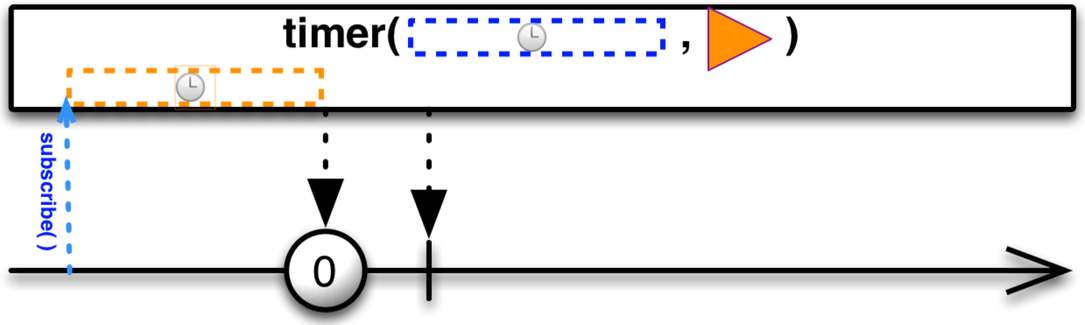
SCHEDULERS

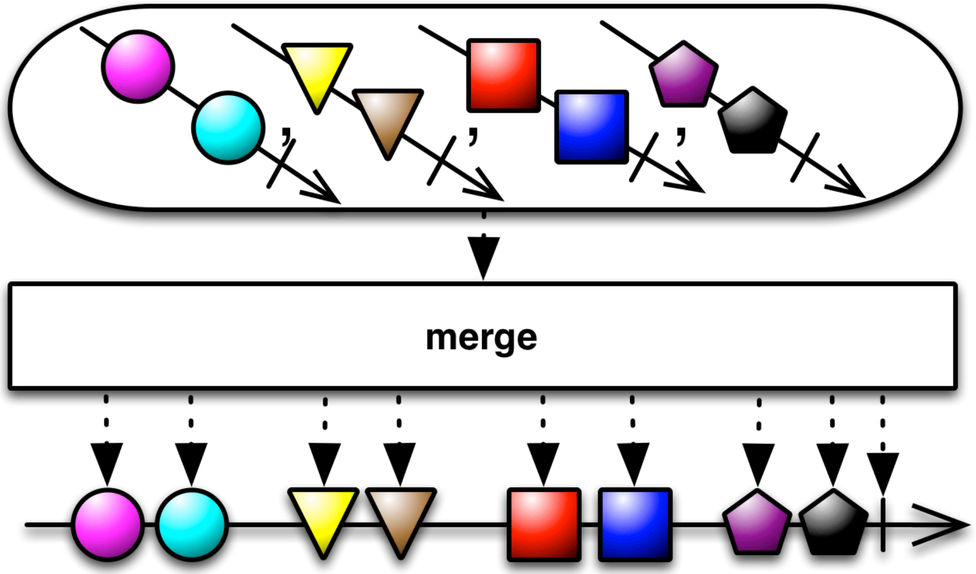
```
Observable.just(5, 6, 7)
          .map { ";-) ".repeat(it) }
          .subscribe { println(it) }
```

```
Observable.just(5, 6, 7)
        .subscribeOn(Schedulers.io())
        .map { ";-) ".repeat(it) }
        .subscribe { println(it) }
```


switchOnNext

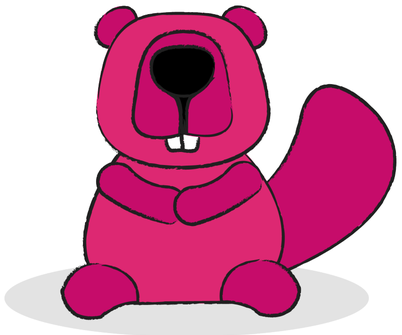

combineLatest { (,) } -


timer(,)
subscribe( )
0


merge

THE BASICS

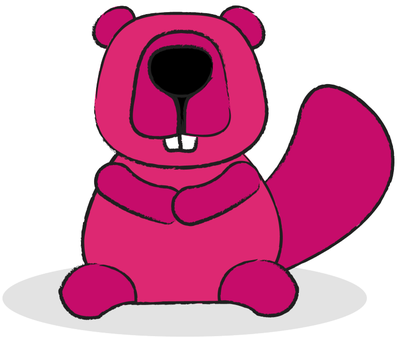
OBSERVABLE



THE BASICS

OBSERVER

OBSERVABLE

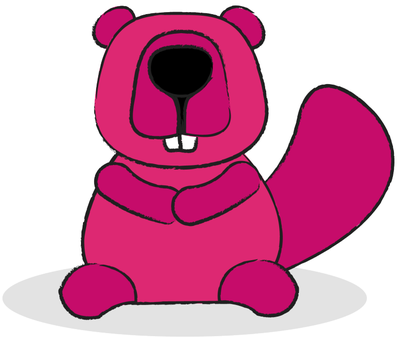


THE BASICS

OPERATORS

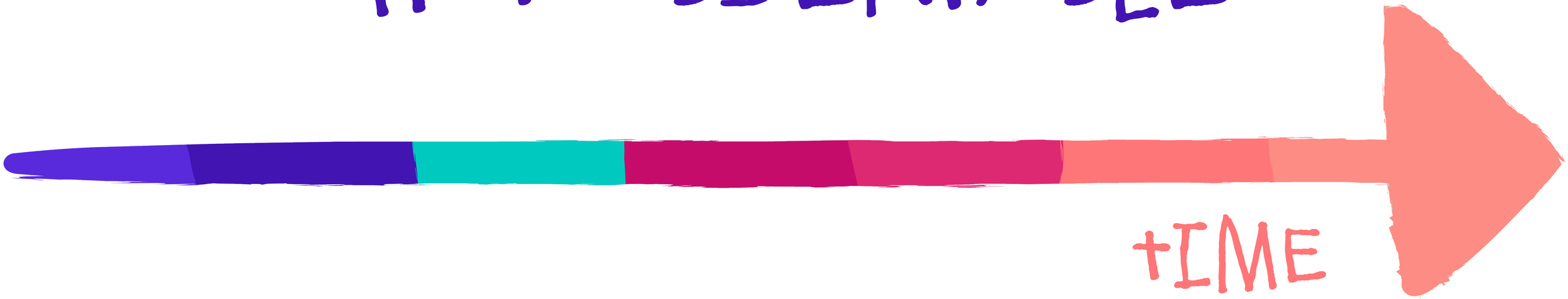
OBSERVER

OBSERVABLE

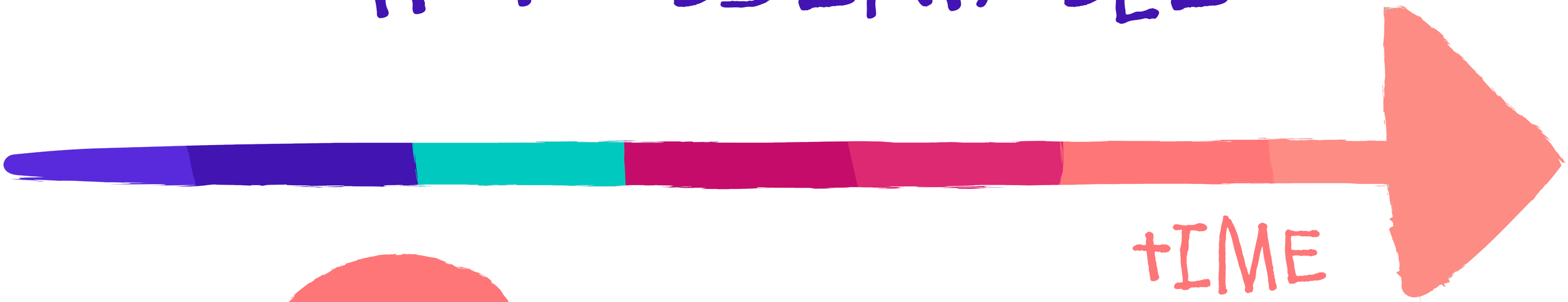


OBSERVABLE

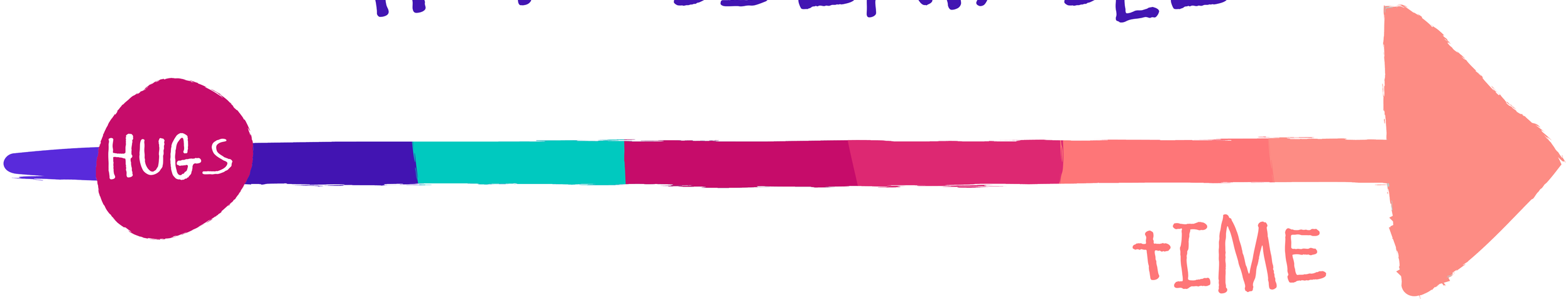
Hot OBSERVABLE

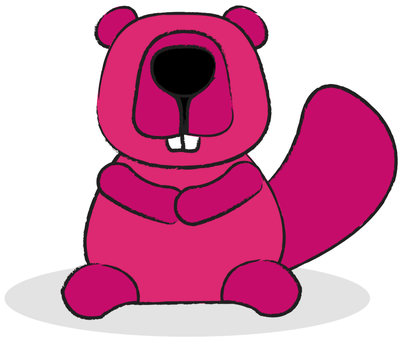


Hot OBSERVABLE

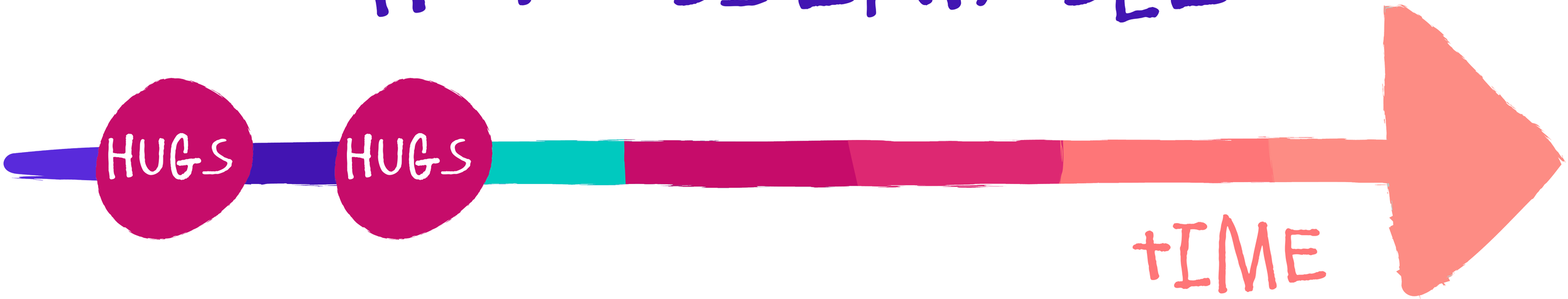


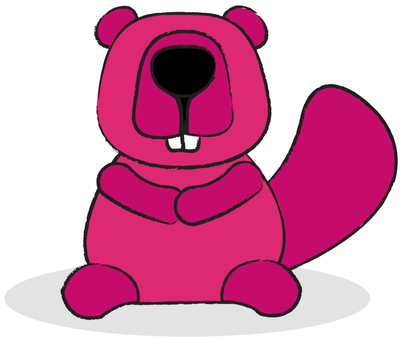
Hot OBSERVABLE



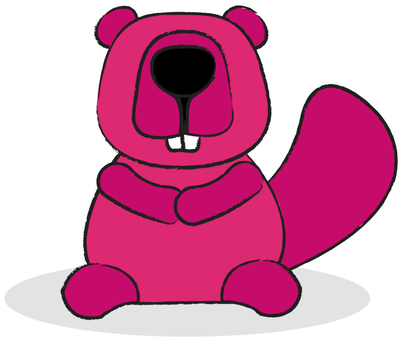


Hot OBSERVABLE





Hot OBSERVABLE



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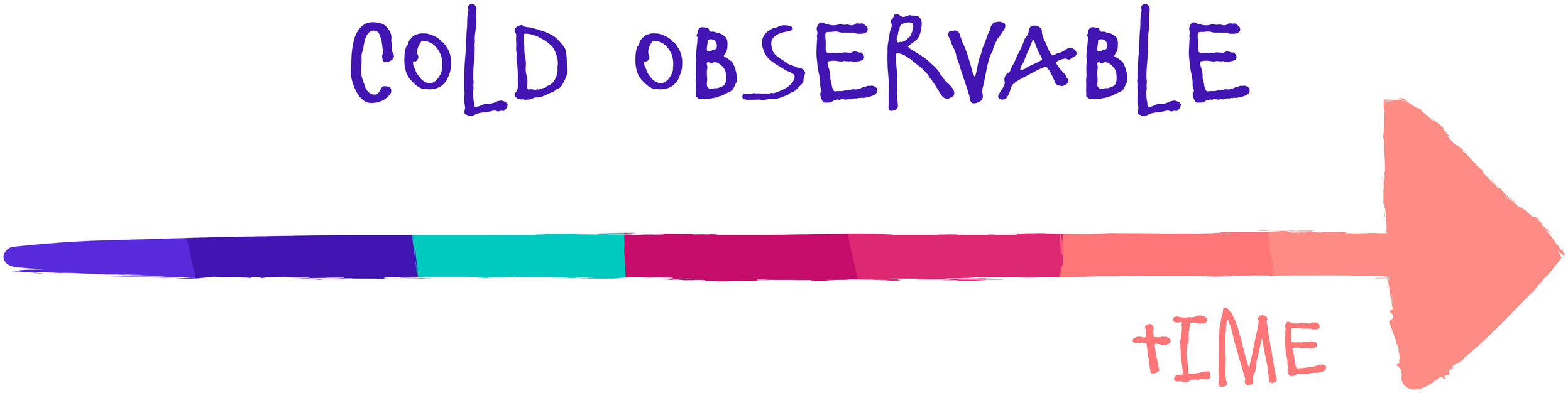
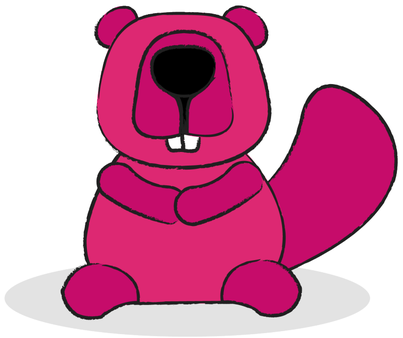
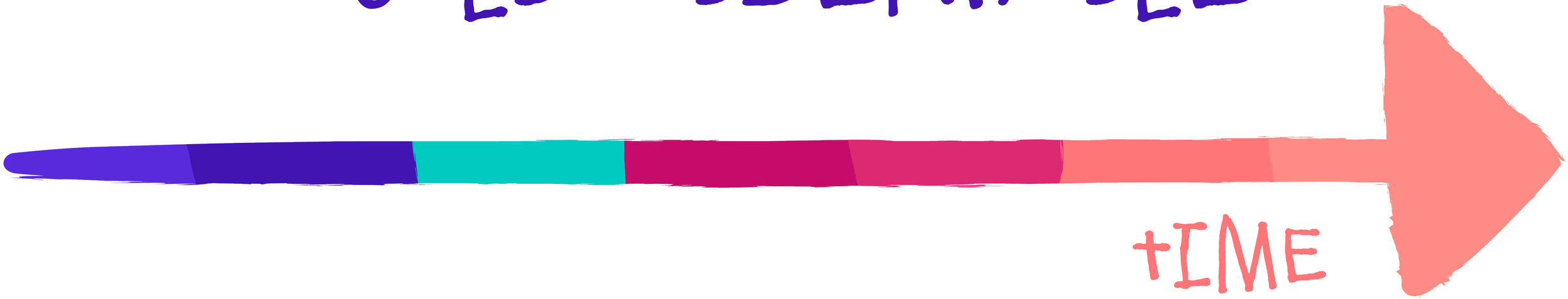
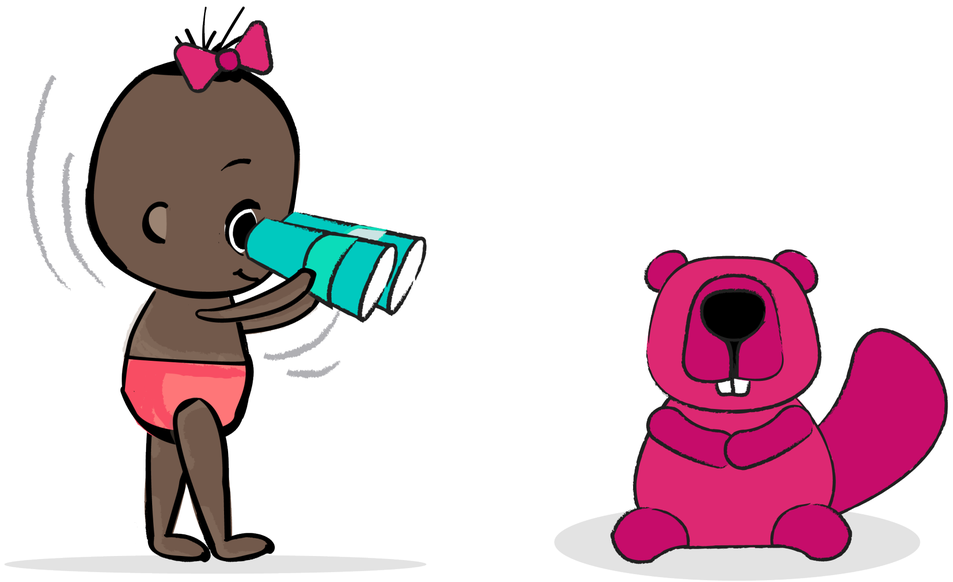

COLD OBSERVABLE
TIME

COLD OBSERVABLE



COLD OBSERVABLE

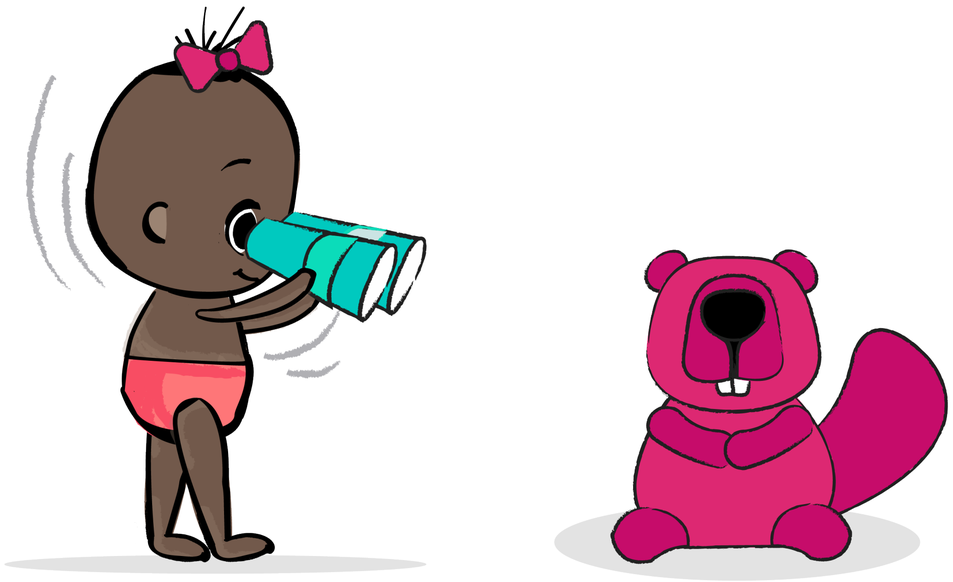




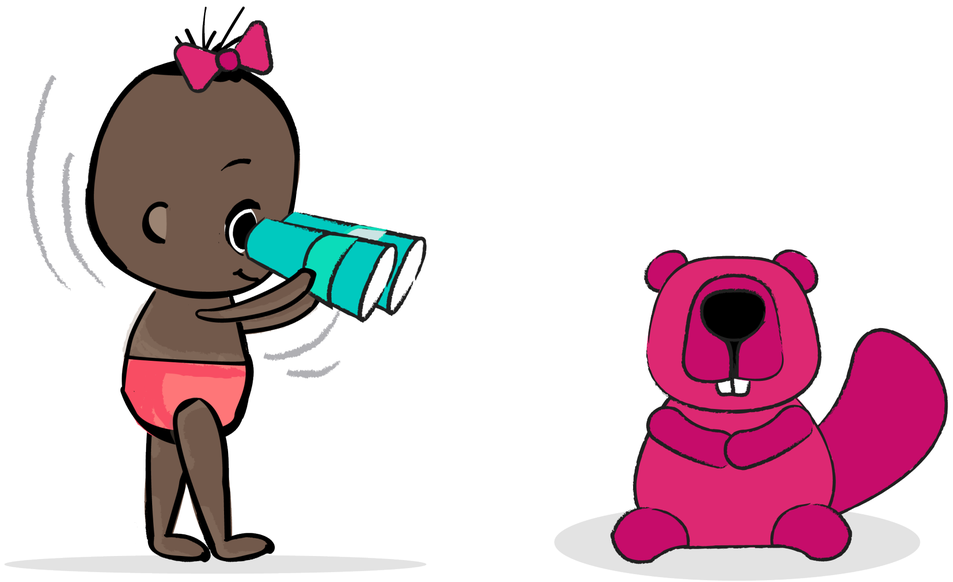
COLD OBSERVABLE

HUGS

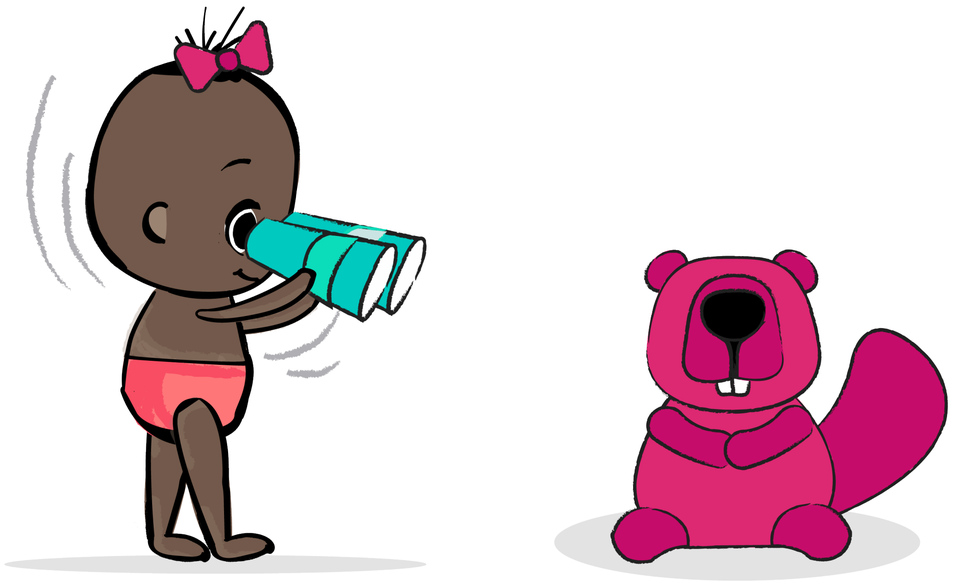
TIME



COLD OBSERVABLE



COLD OBSERVABLE



CLICK EVENTS

PUSH NOTIFICATIONS

KEYBOARD INPUT

READING A FILE

DATABASE ACCESS

DEVICE SENSOR UPDATES

WHERE?

```
Observable.create<Int> { subscriber -> }
```

```
Observable.create<Int> { subscriber -> }

Observable.just(item1, item2, item3)
```

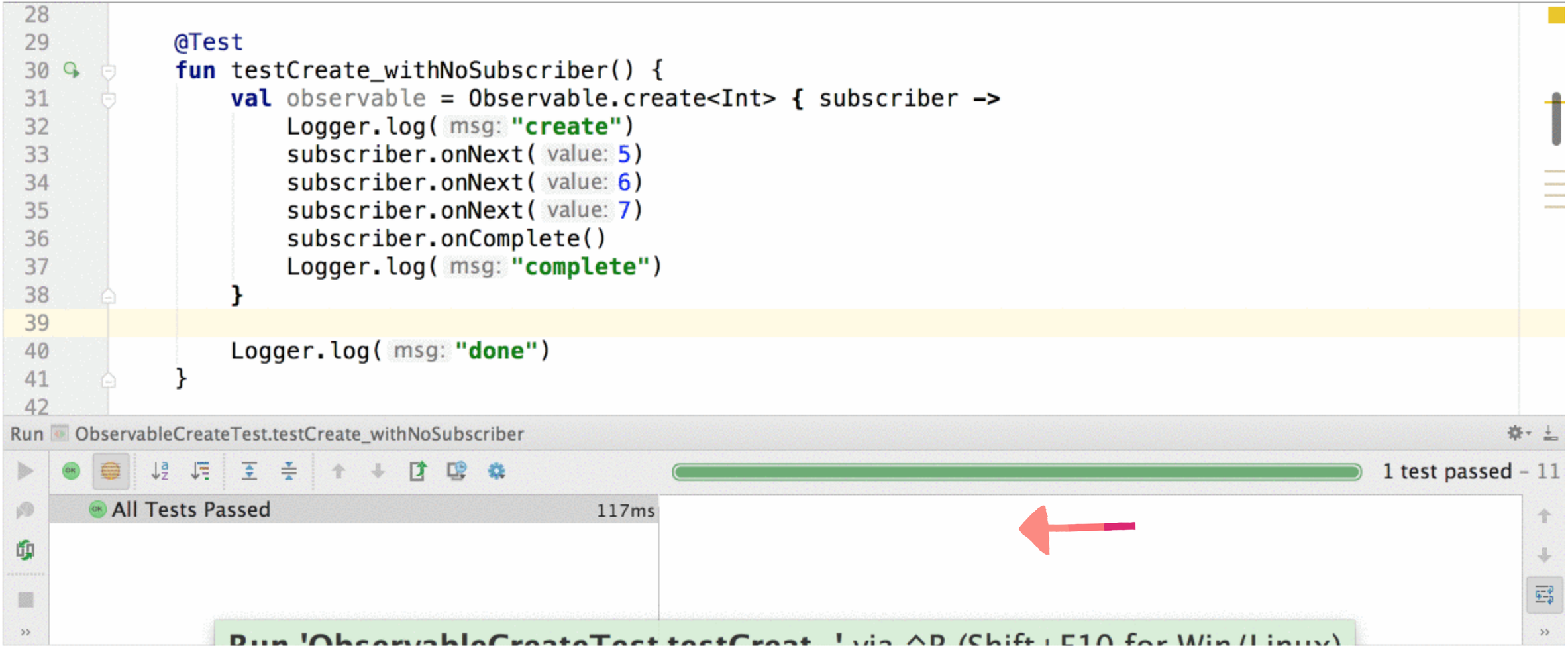
```
Observable.create<Int> { subscriber -> }

Observable.just(item1, item2, item3)

Observable.interval(2, TimeUnit.SECONDS)
```

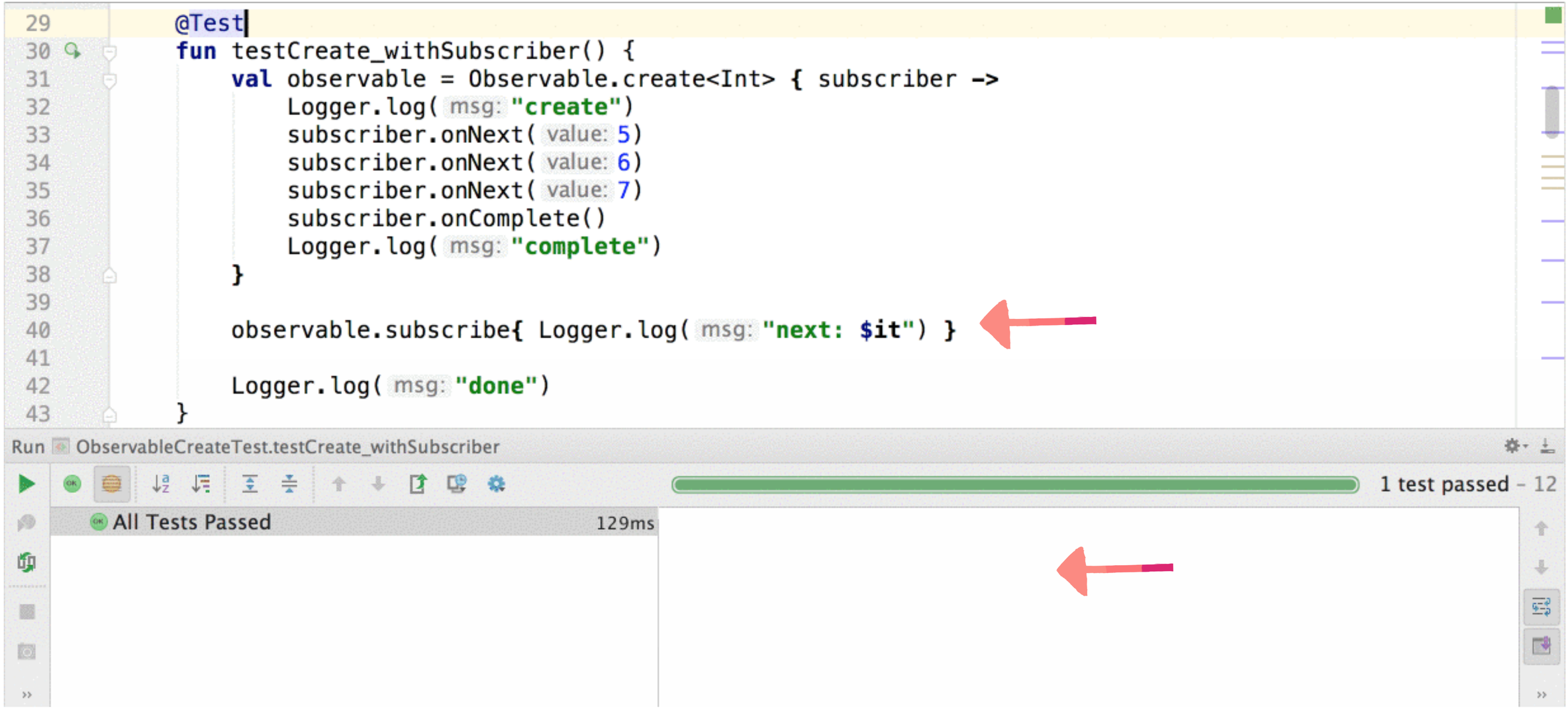
```
Observable.create<Int> { subscriber ->



}
```

```
Observable.create<Int> { subscriber ->
    Logger.log("create")



    Logger.log("complete")
}

Logger.log("done")
```

```
Observable.create<Int> { subscriber ->
    Logger.log("create")
    subscriber.onNext(5)
    subscriber.onNext(6)
    subscriber.onNext(7)

    Logger.log("complete")
}

Logger.log("done")
```

```
Observable.create<Int> { subscriber ->
    Logger.log("create")
    subscriber.onNext(5)
    subscriber.onNext(6)
    subscriber.onNext(7)
    subscriber.onComplete()
    Logger.log("complete")
}

Logger.log("done")
```


28
29 @Test
30 fun testCreate_withNoSubscriber() {
31 val observable = Observable.create<Int> { subscriber ->
32 Logger.log(msg: "create")
33 subscriber.onNext(value: 5)
34 subscriber.onNext(value: 6)
35 subscriber.onNext(value: 7)
36 subscriber.onComplete()
37 Logger.log(msg: "complete")
38 }
39
40 Logger.log(msg: "done")
41 }
42
Run ObservableCreateTest.testCreate_withNoSubscriber
1 test passed – 11
All Tests Passed 117ms

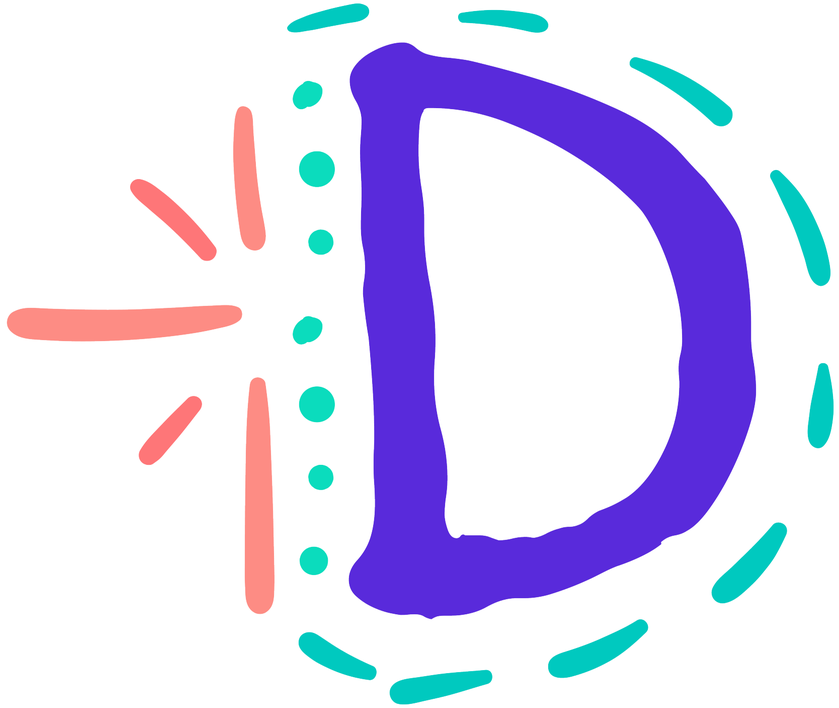

29 @Test
30 fun testCreate_withSubscriber() {
31 val observable = Observable.create<Int> { subscriber ->
32 Logger.log(msg: "create")
33 subscriber.onNext(value: 5)
34 subscriber.onNext(value: 6)
35 subscriber.onNext(value: 7)
36 subscriber.onComplete()
37 Logger.log(msg: "complete")
38 }
39
40 observable.subscribe{ Logger.log(msg: "next: $it") }
41
42 Logger.log(msg: "done")
43 }
Run ObservableCreateTest.testCreate_withSubscriber
1 test passed - 12
All Tests Passed 129ms

OBSERVABLES CAN. . .

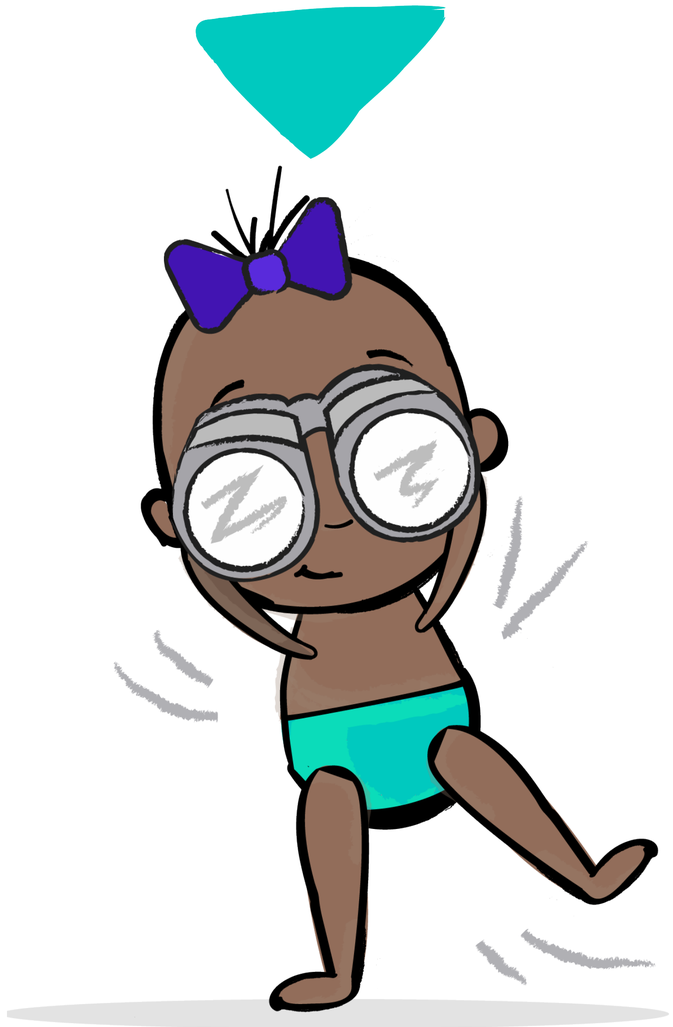
- A: EMIT ITEMS
- B: BE COLD
- C: BE HOT
- D: ALL OF THE ABOVE

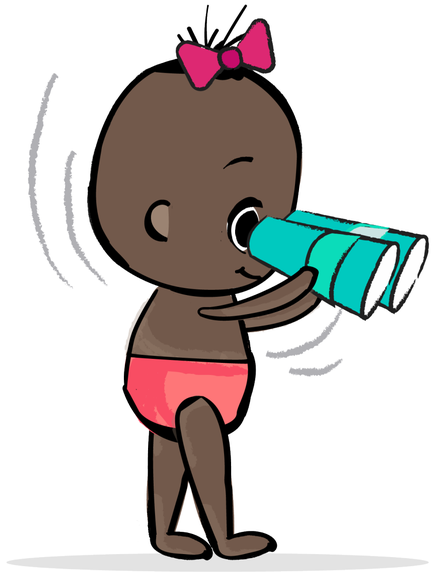
OBSERVABLES CAN. . .

- A: EMIT ITEMS
- B: BE COLD
- C: BE HOT
- D: ALL OF THE ABOVE

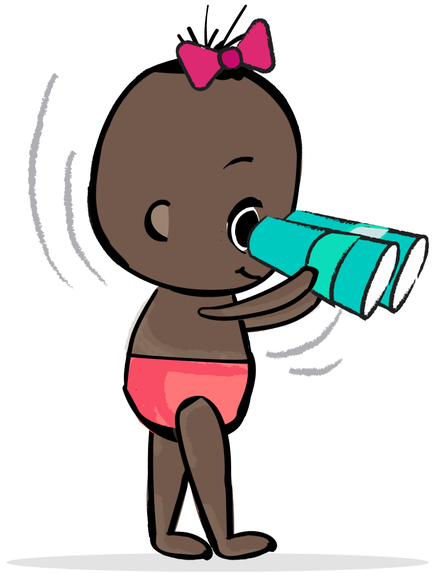


OBSERVER

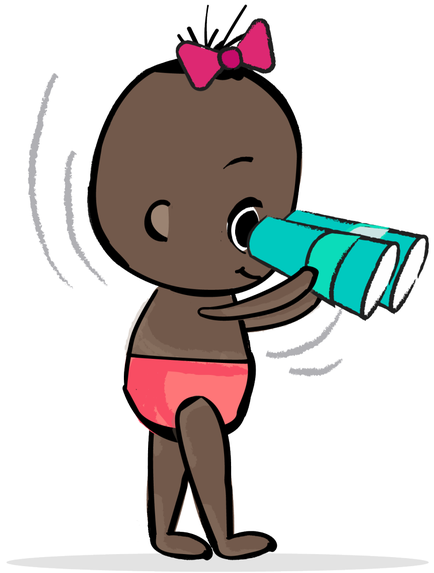




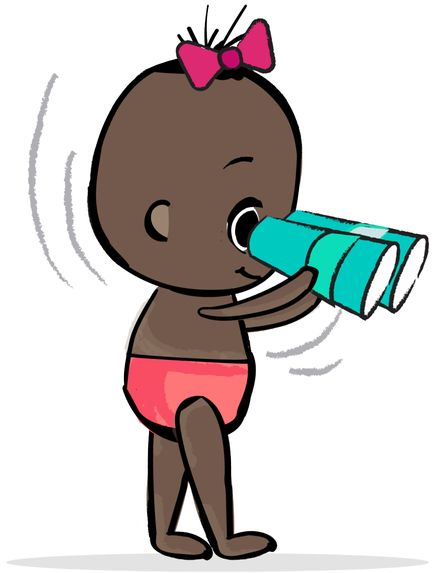
```
interface Observer<T> {
    fun onError(e: Throwable)

    fun onComplete()

    fun onNext(t: T)

    fun onSubscribe(d: Disposable)
}
```



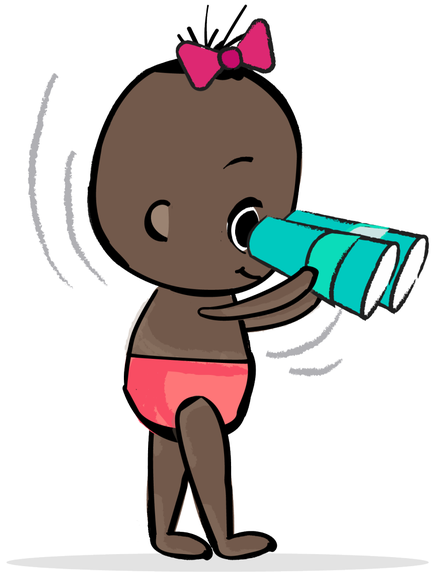
```
interface Observer<T> {
    fun onError(e: Throwable)

    fun onComplete()

    fun onNext(t: T)

    fun onSubscribe(d: Disposable)
}
```



```
interface Observer<T> {
    fun onError(e: Throwable)

    fun onComplete()

    fun onNext(t: T)

    fun onSubscribe(d: Disposable)
}
```

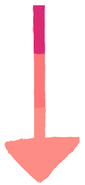


```
interface Observer<T> {
    fun onError(e: Throwable)

    fun onComplete()

    fun onNext(t: T)

    fun onSubscribe(d: Disposable)
}
```



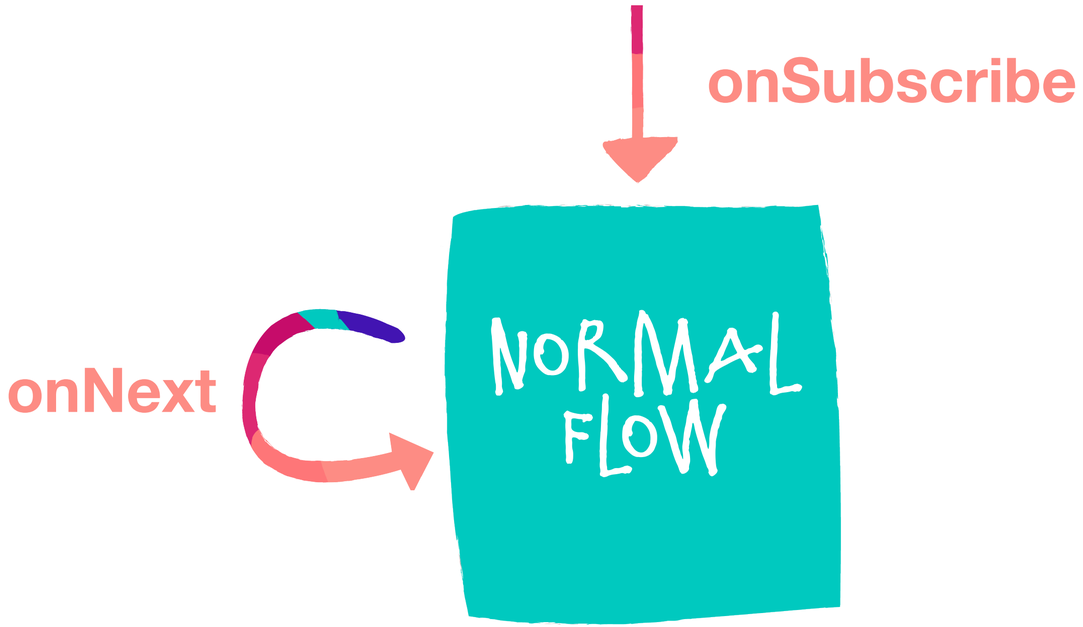
```
interface Observer<T> {
    fun onError(e: Throwable)

    fun onComplete()

    fun onNext(t: T)

    fun onSubscribe(d: Disposable)
}
```

OBSERVER'S LIFECYCLE

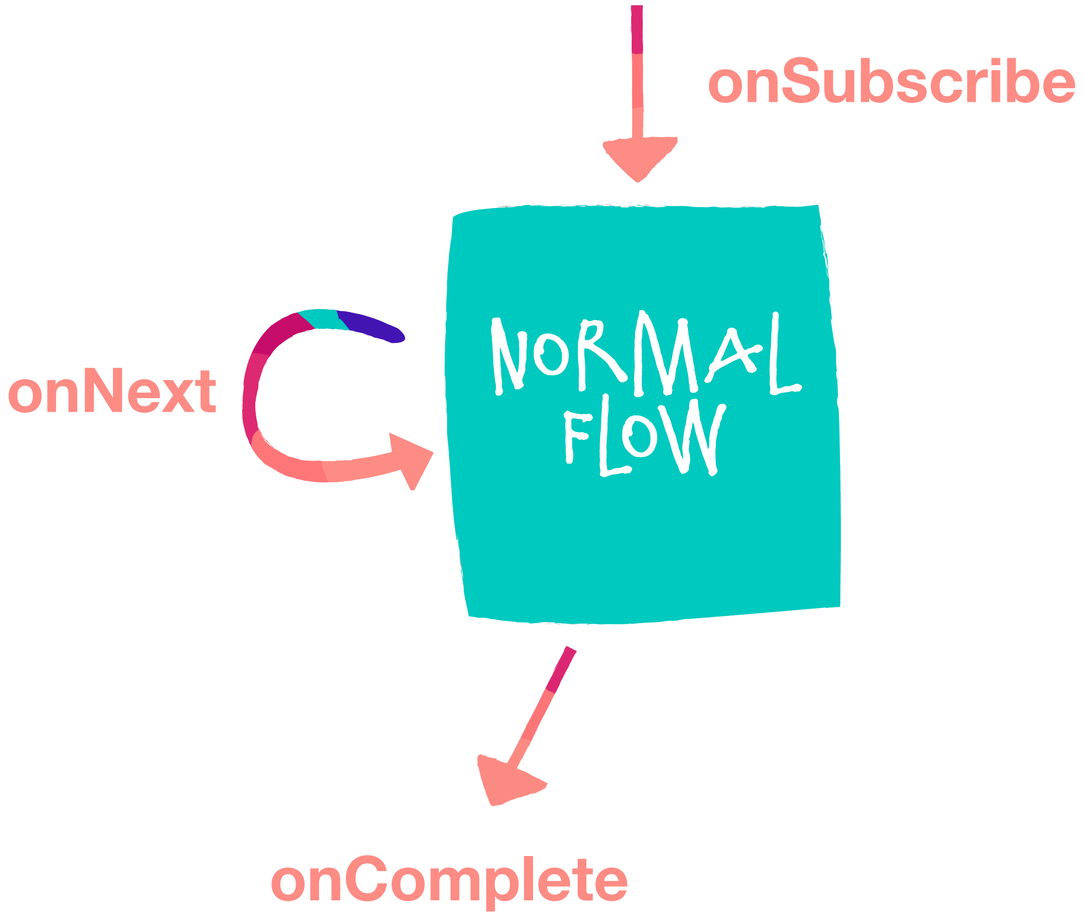


onSubscribe

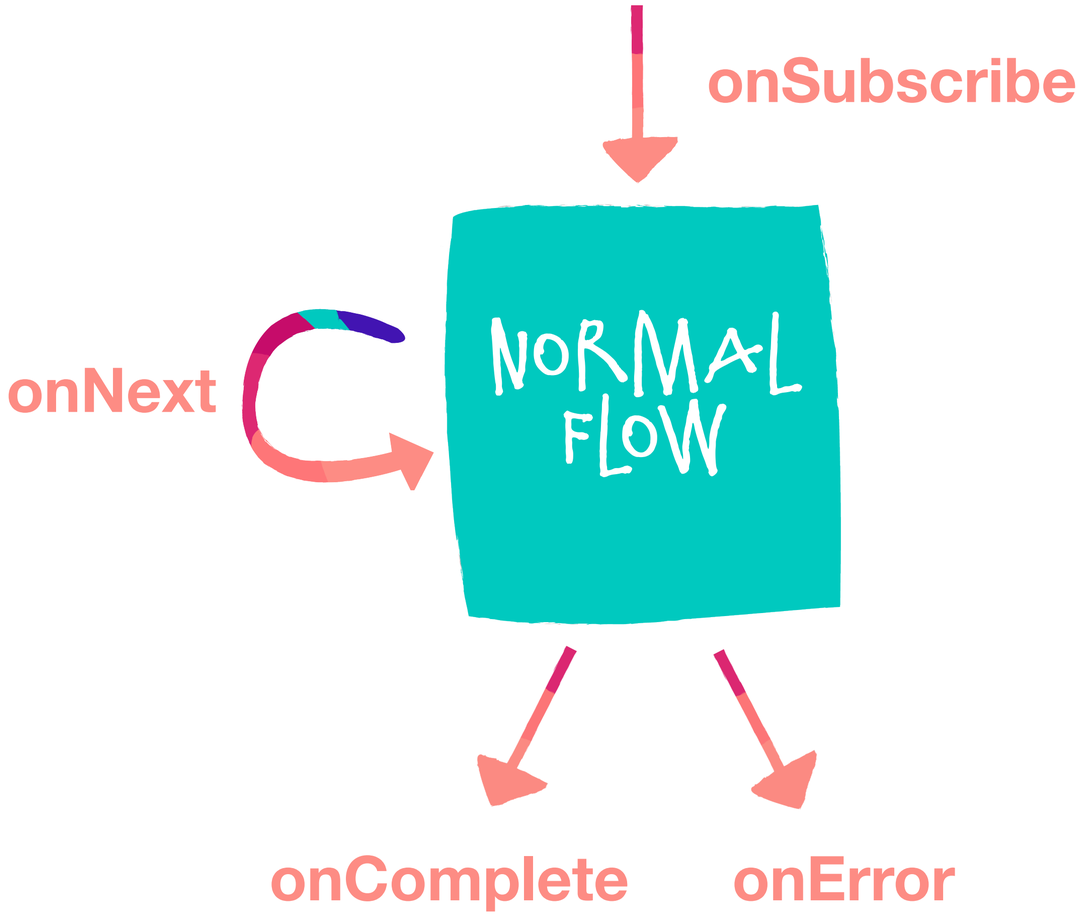
OBSERVER'S LIFECYCLE



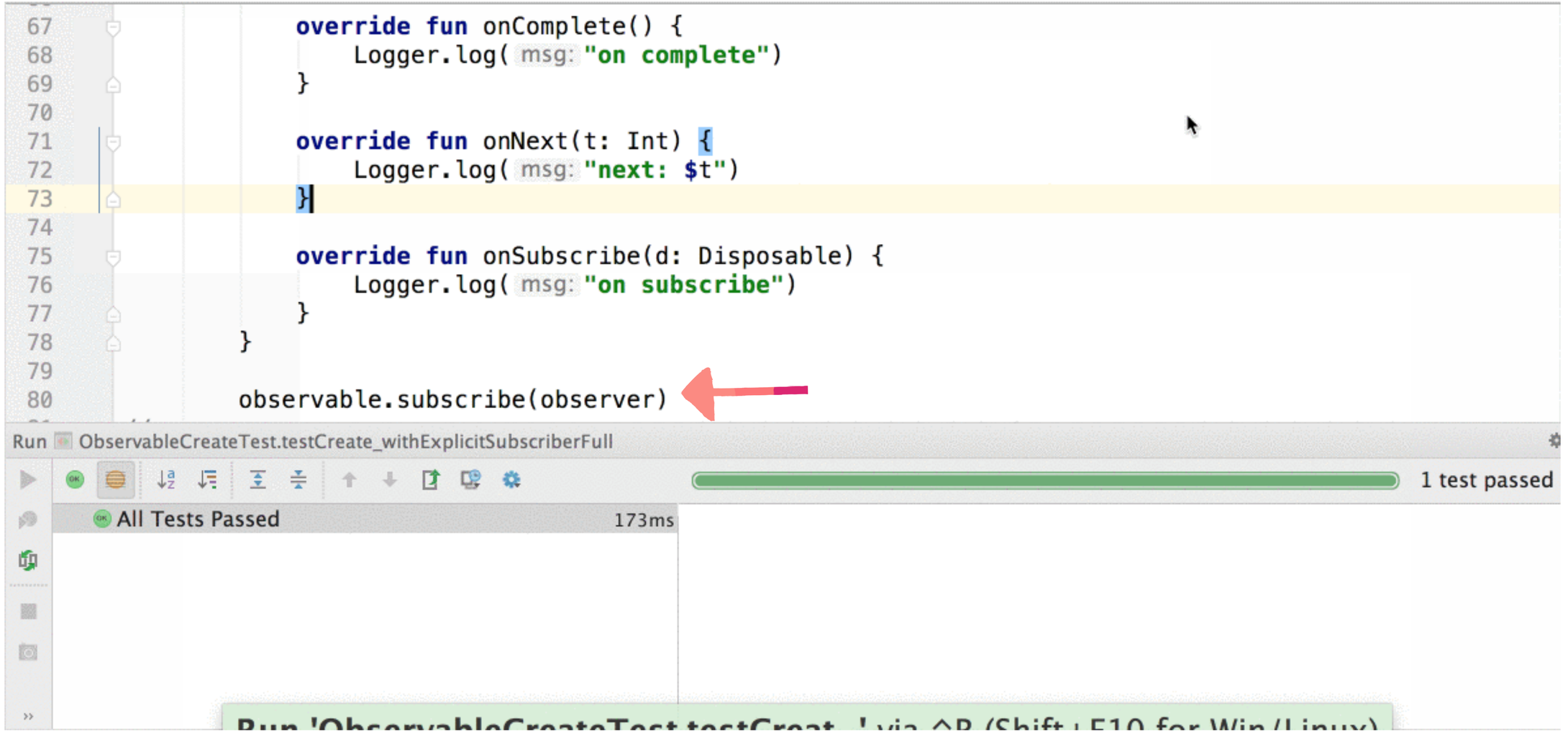
OBSERVER'S LIFECYCLE



OBSERVER'S LIFECYCLE



```
val observer = object : Observer<Int> {
    override fun onError(e: Throwable) {
        Logger.log(e)
    }

    override fun onComplete() {
        Logger.log("on complete")
    }

    override fun onNext(t: Int) {
        Logger.log("next: $t")
    }

    override fun onSubscribe(d: Disposable) {
        Logger.log("on subscribe")
    }
}
```


override fun onComplete() {
Logger.log(msg: "on complete")
}
override fun onNext(t: Int) {
Logger.log(msg: "next: $t")
}
override fun onSubscribe(d: Disposable) {
Logger.log(msg: "on subscribe")
}
}
observable.subscribe(observer)
Run ObservableCreateTest.testCreate_withExplicitSubscriberFull
1 test passed
All Tests Passed
173ms

```
interface Consumer<T> {

    fun accept(t: T)
}
```

```
val consumer = object : Consumer<Int> {

    override fun accept(t: Int) {
        Logger.log("next: $t")
    }

}
```

```
            subscriber.onNext( value: 6)
            subscriber.onNext( value: 7)
            subscriber.onComplete()
            Logger.log( msg: "complete")
        }

        val consumer = object : Consumer<Int> {
            override fun accept(t: Int) {
                Logger.log( msg: "next: $t")
            }
        }

        observable.subscribe(consumer)
    }
```

servableCreateTest.testCreate_withExplicitSubscriberFull

1 test passed

All Tests Passed 148ms

```
1507747777513: main: create
1507747777513: main: next: 5
1507747777513: main: next: 6
1507747777513: main: next: 7
1507747777513: main: complete

Process finished with exit code 0
```

```
            subscriber.onNext( value: 6)
            subscriber.onNext( value: 7)
            subscriber.onComplete()
            Logger.log( msg: "complete")
        }

        val consumer = object : Consumer<Int> {
            override fun accept(t: Int) {
                Logger.log( msg: "next: $t")
            }
        }

        observable.subscribe(consumer)
    }
```

ervableCreateTest.testCreate_withExplicitSubscriberFull

All Tests Passed 148ms

```
1507747777513: main: create
1507747777513: main: next: 5
1507747777513: main: next: 6
1507747777513: main: next: 7
1507747777513: main: complete
```

Consumer

```
val consumer = Consumer<Int> { t -> Logger.log("next: $t") }

obs.subscribe(consumer)
```

CONSUMER

```
obs.subscribe(Consumer<Int> { t -> Logger.log("next: $t") })
```

CONSUMER

```
obs.subscribe({ t -> Logger.log("next: $t") })
```

CONSUMER

```
obs.subscribe{ t -> Logger.log("next: $t") }
```

CONSUMER

```
obs.subscribe{ Logger.log("next: $it") }
```

```kotlin
@Test
fun testCreate_withExplicitSubscriberFull() {
    val observable = Observable.create<Int> { subscriber ->
        Logger.log( msg: "create")
        subscriber.onNext( value: 5)
        subscriber.onNext( value: 6)
        subscriber.onNext( value: 7)
        subscriber.onComplete()
        Logger.log( msg: "complete")
    }

    observable.subscribe{ Logger.log( msg: "next: $it") }
}
```

ervableCreateTest.testCreate_withExplicitSubscriberFull









1 test passed

All Tests Passed 250ms

```
1507749694482: main: create
1507749694482: main: next: 5
1507749694482: main: next: 6
1507749694482: main: next: 7
1507749694482: main: complete

Process finished with exit code 0
```

OBSERVERS. . .

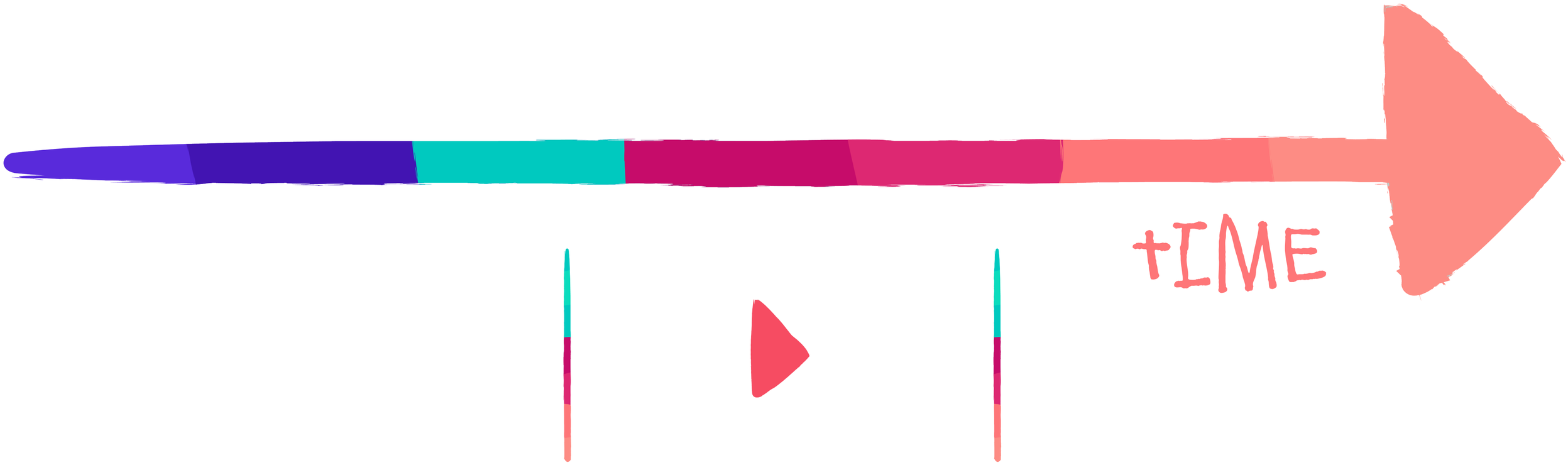
- A: HAVE A LIFECYCLE
- B: ALWAYS COMPLETE
- C: NEVER ERROR
- D: ALL OF THE ABOVE

OBSERVERS. . .

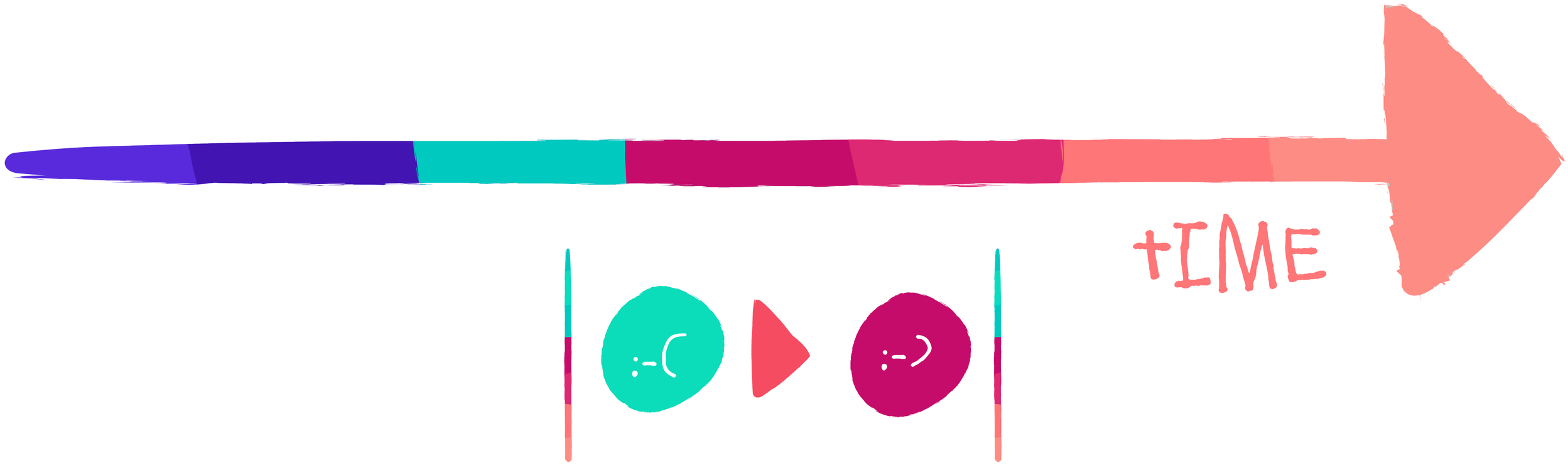
- A: HAVE A LIFECYCLE
- B: ALWAYS COMPLETE
- C: NEVER ERROR
- D: ALL OF THE ABOVE

OPERATOR

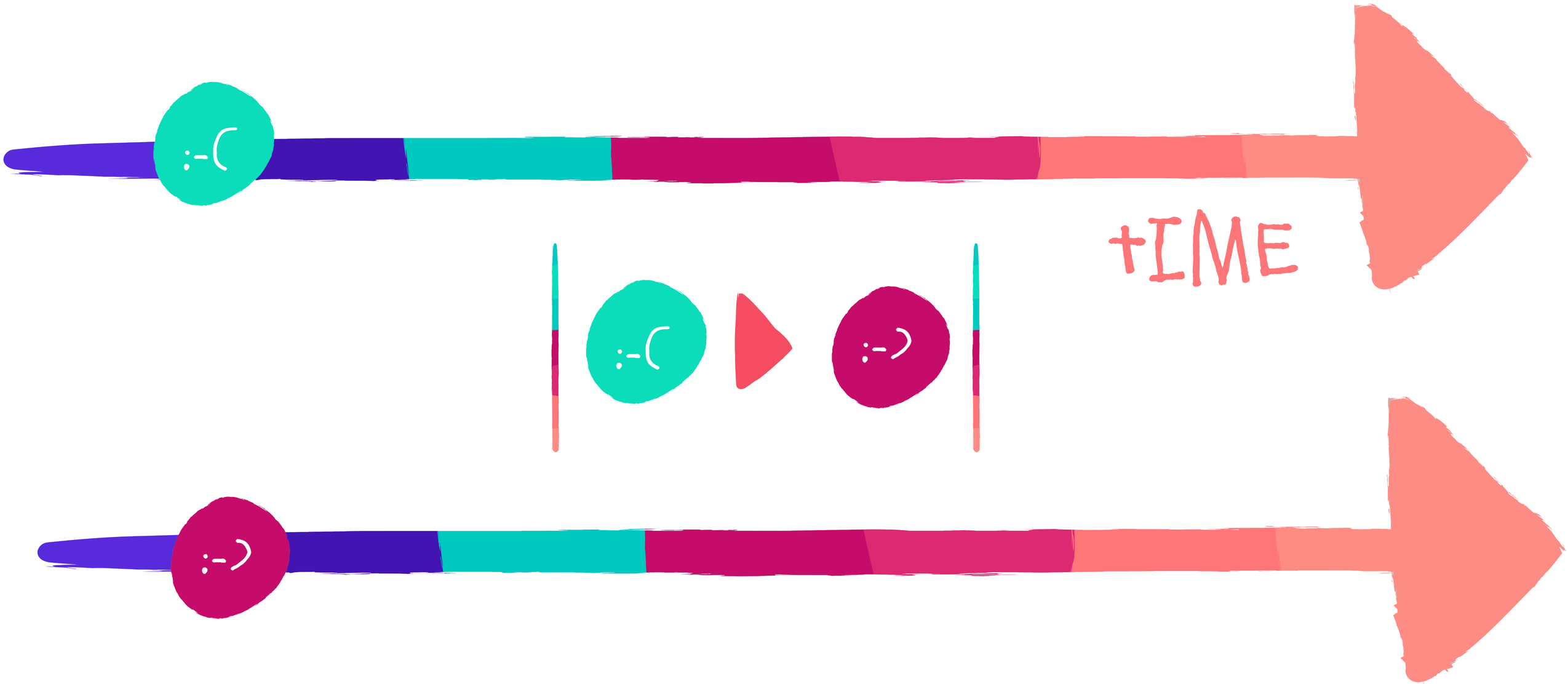
OPERATOR: MAP()



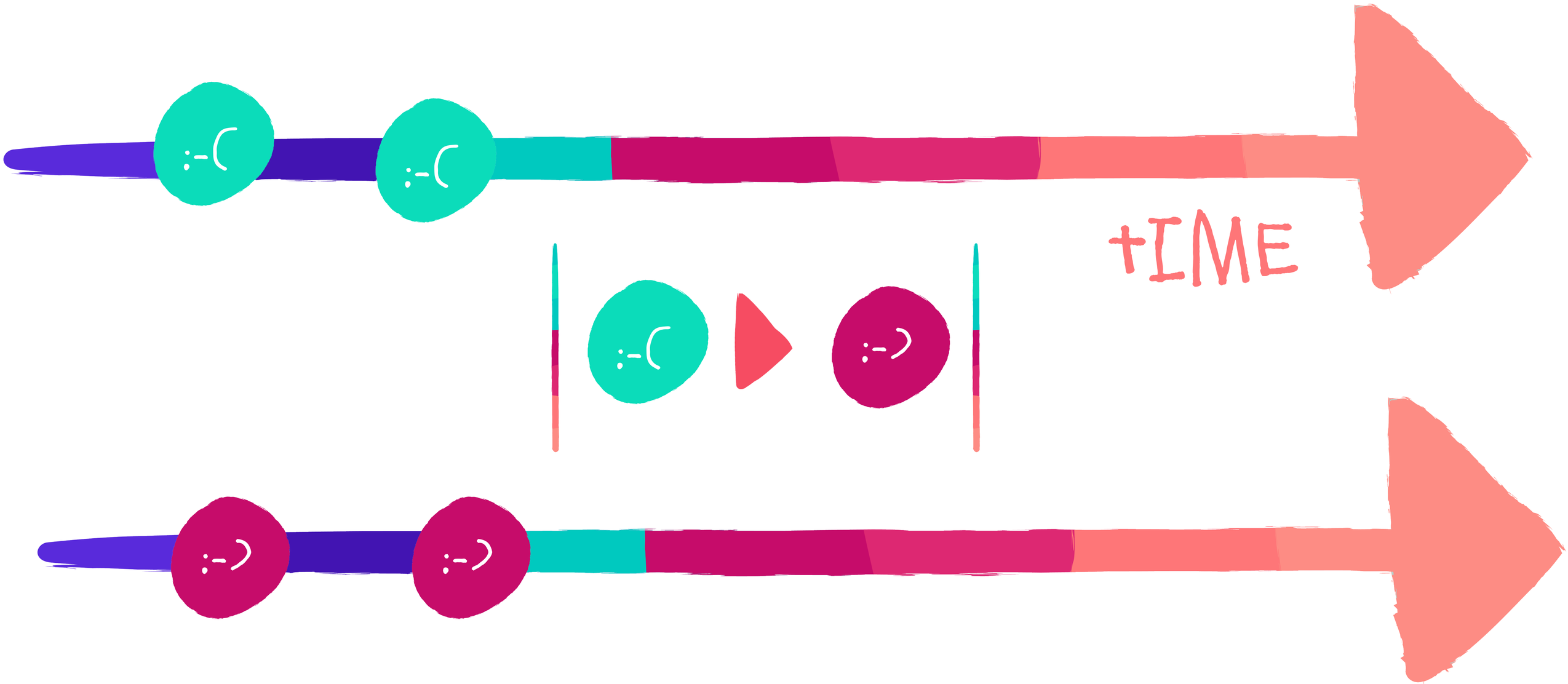
OPERATOR: MAP()



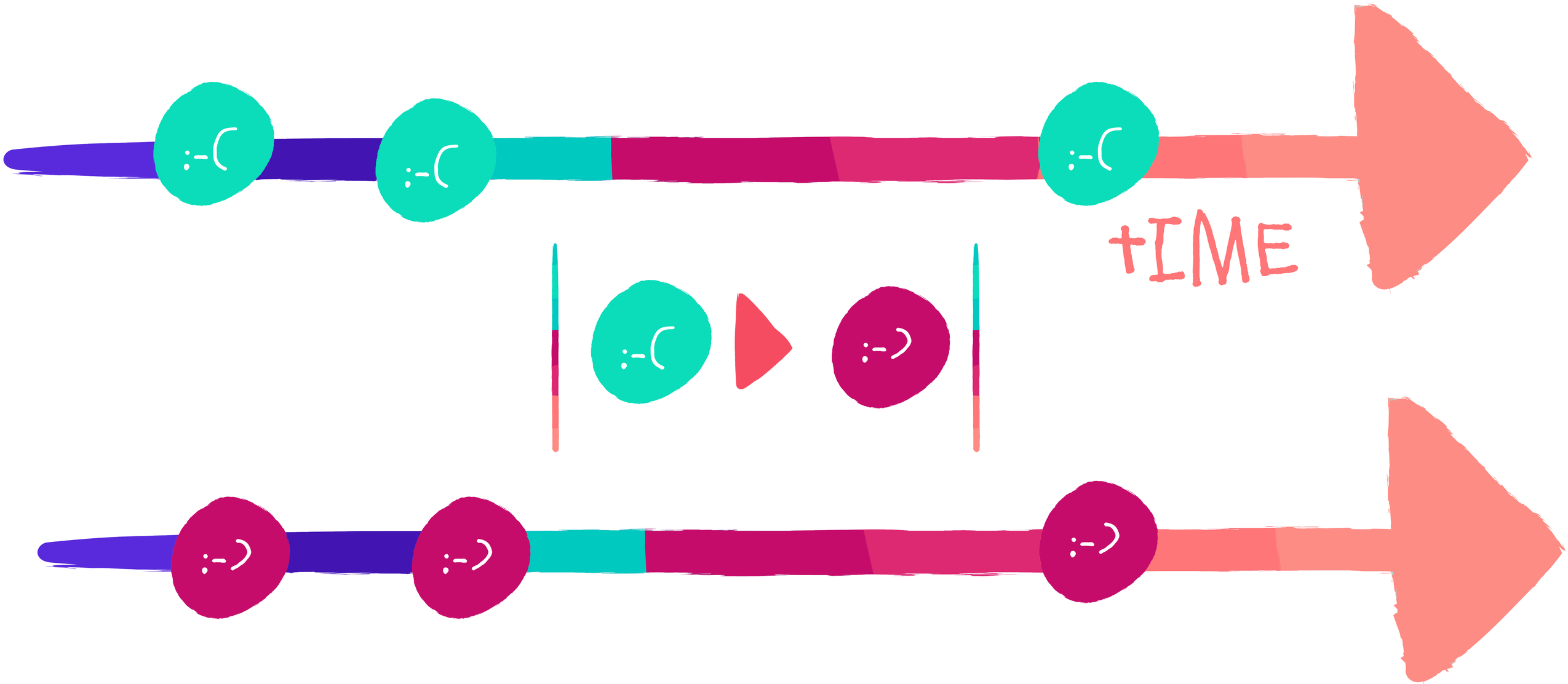
OPERATOR: MAP()



OPERATOR: MAP()



OPERATOR: MAP()



Operator: map()

```
Observable.just(5, 6, 7)
        .map { ";-) ".repeat(it) }
        .subscribe { println(it) }
```

OPERATOR: MAP()

```
Observable.just(5, 6, 7)
          .map { ";-) ".repeat(it) }
          .subscribe { println(it) }
```

```
;-) ;-) ;-) ;-) ;-)
;-) ;-) ;-) ;-) ;-) ;-)
;-) ;-) ;-) ;-) ;-) ;-) ;-)
```

OPERATOR: MAP()

```
Observable.just(5, 6, 7)
        .map(object: Function<Int, String> {
            override fun apply(t: Int): String {
                return ";-) ".repeat(t)
            }
        })
        .subscribe { println(it) }
```

OPERATOR: MAP()

```
Observable.just(5, 6, 7)
        .map(object: Function<Int, String> {
            override fun apply(t: Int): String {
                return ";-) ".repeat(t)
            }
        })
        .subscribe { println(it) }
```

OPERATOR: MAP()

```
Observable.just(5, 6, 7)
        .map(object: Function<Int, String> {
            override fun apply(t: Int): String {
                return ";-) ".repeat(t)
            }
        })
        .subscribe { println(it) }
```

OPERATOR: MAP()

```
Observable.just(5, 6, 7)
        .map(object: Function<Int, String> {
            override fun apply(t: Int): String {
                return ";-) ".repeat(t)
            }
        })
        .subscribe { println(it) }
```

```
.map(object: Function<Int, String> {
    override fun apply(t: Int): String {
        return ";-) ".repeat(t)
    }
})
```

```
.map { ";-) ".repeat(it) }
```

WHAT'S THE OUTPUT?

```
Observable.just(1, 2, 3)
        .map { it * 2 }
        .subscribe { println(it) }
```

WHAT'S THE OUTPUT?

```
Observable.just(1, 2, 3)
        .map { it * 2 }
        .subscribe { println(it) }
```


A: 1, 2, 3


B: A, B, C

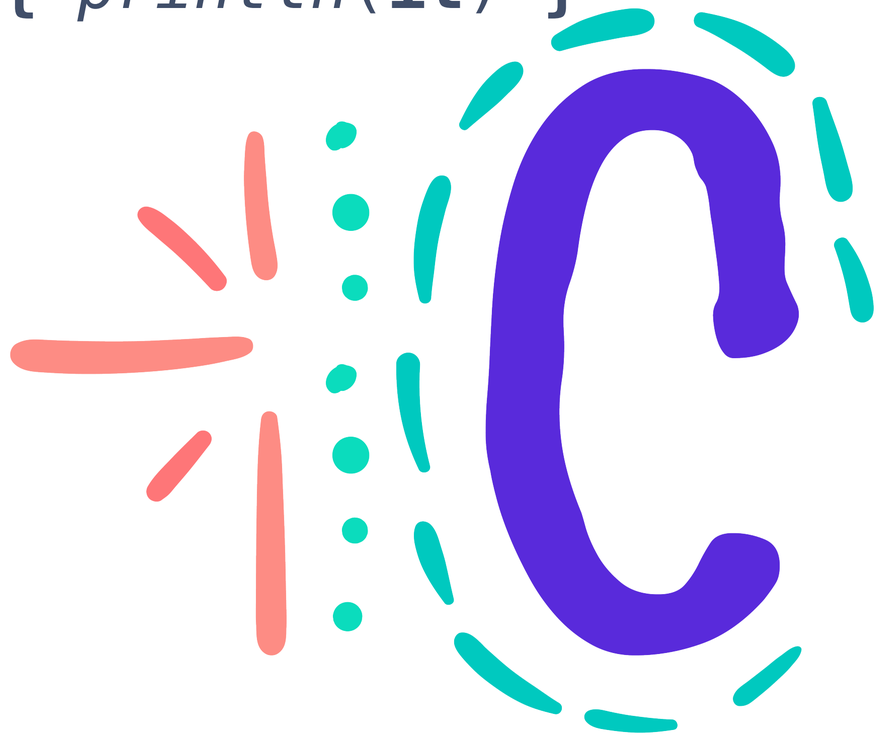

C: 2, 4, 6


D: 6, 2, 4

WHAT'S THE OUTPUT?

```
Observable.just(1, 2, 3)
        .map { it * 2 }
        .subscribe { println(it) }
```

- A: 1, 2, 3
- B: A, B, C
- C: 2, 4, 6
- D: 6, 2, 4



WHAT'S THE OUTPUT?

```
Observable.just(1, 2, 3)
        .map { it * 2 }
        .filter { it < 6 }
        .subscribe { println(it) }
```

WHAT'S THE OUTPUT?

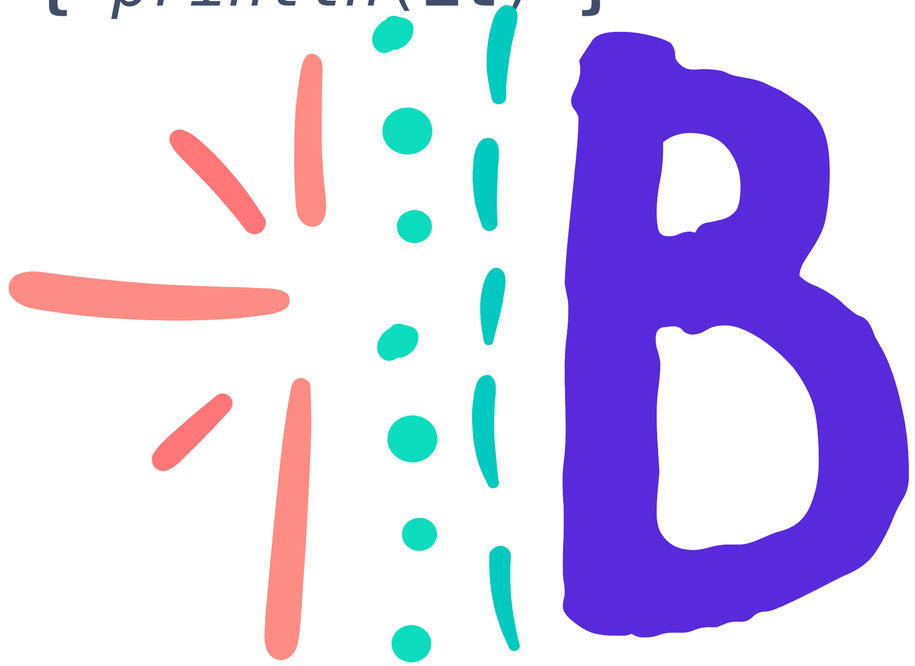
```
Observable.just(1, 2, 3)
        .map { it * 2 }
        .filter { it < 6 }
        .subscribe { println(it) }
```

- A: 2, 3, 1
- B: 2, 4
- C: 1, 2, 3
- D: 6, 4

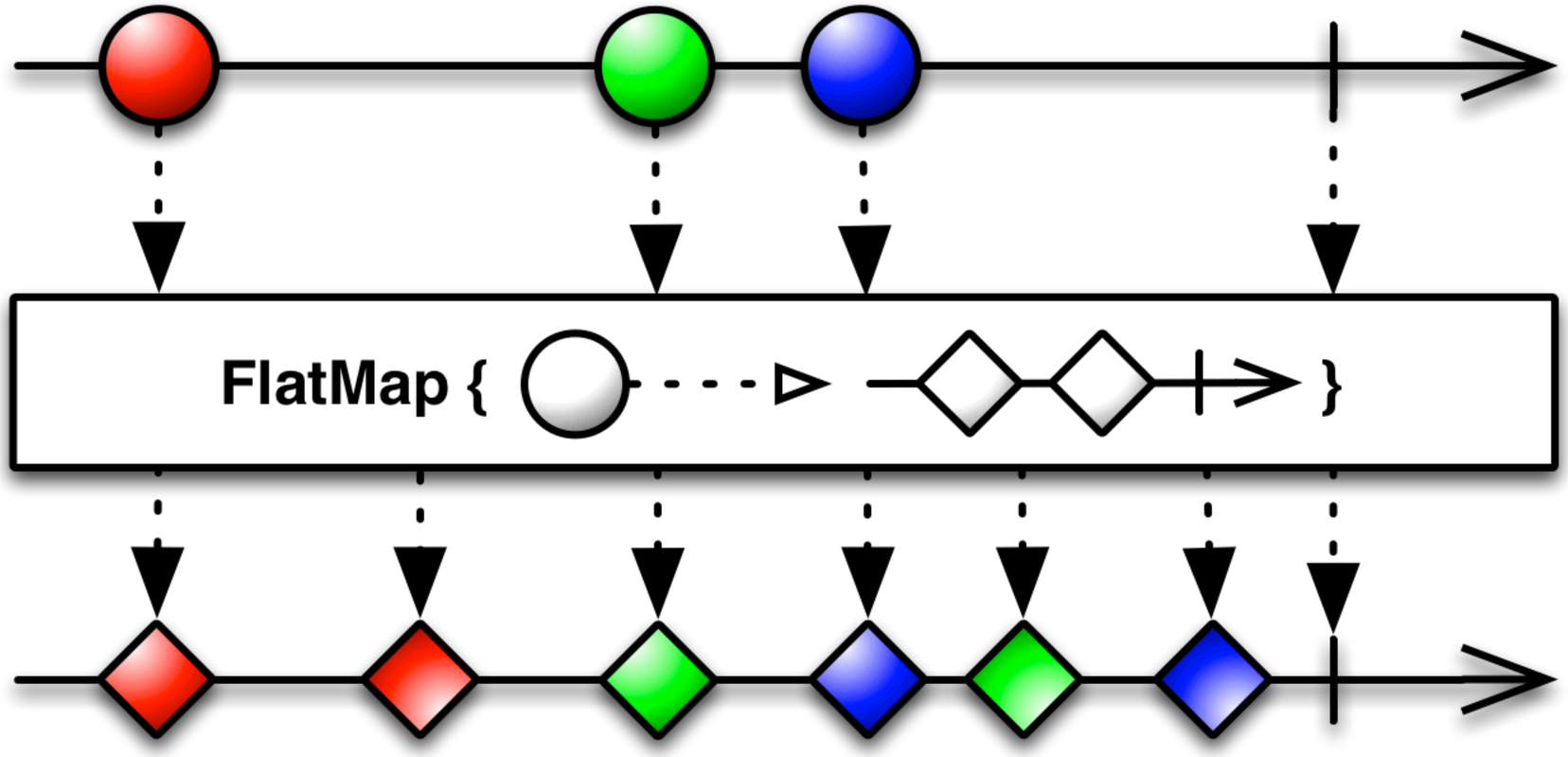
WHAT'S THE OUTPUT?

```
Observable.just(1, 2, 3)
        .map { it * 2 }
        .filter { it < 6 }
        .subscribe { println(it) }
```

- A: 2, 3, 1
- B: 2, 4
- C: 1, 2, 3
- D: 6, 4

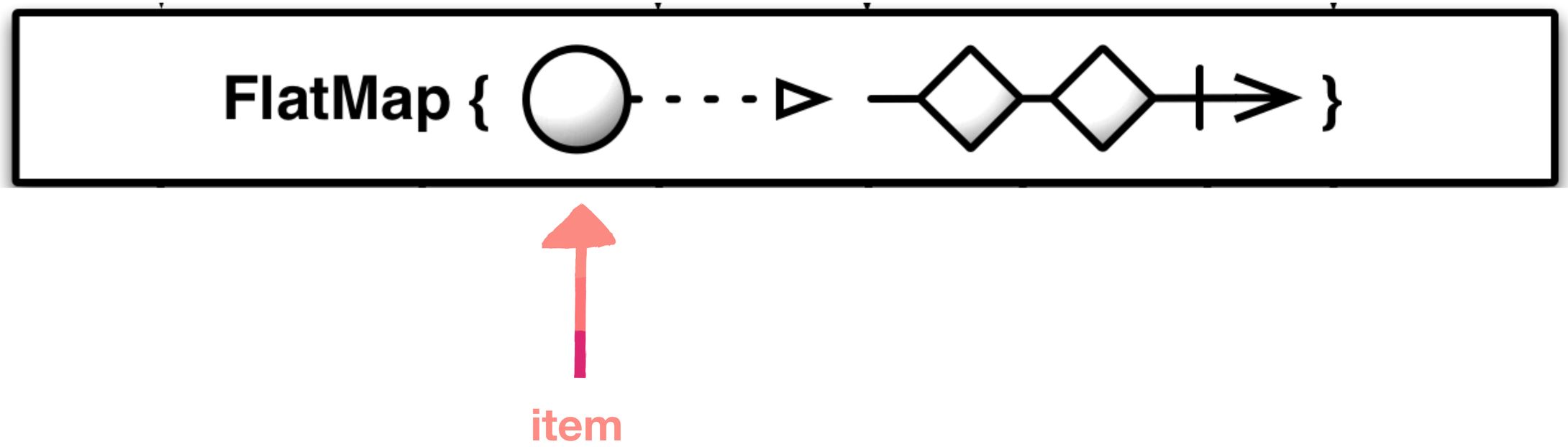


OPERATOR: FLATMAP()



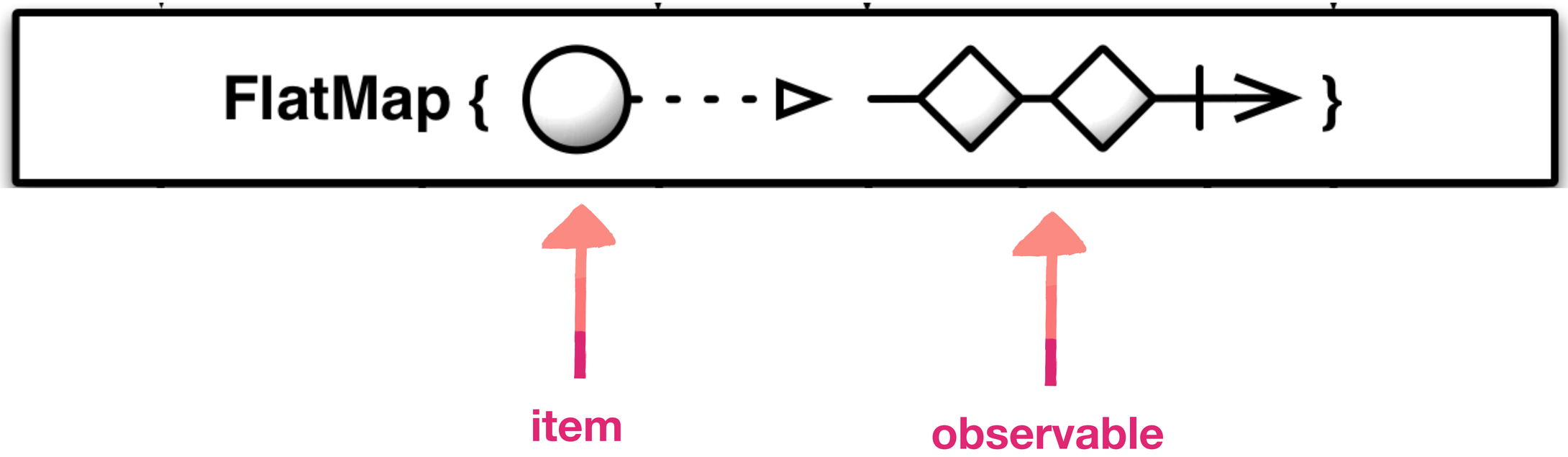
via reactivex.io

OPERATOR: FLATMAP()



via reactivex.io

OPERATOR: FLATMAP()

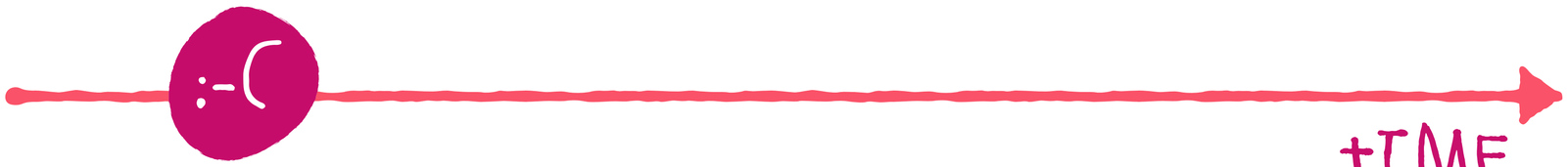


via reactivex.io

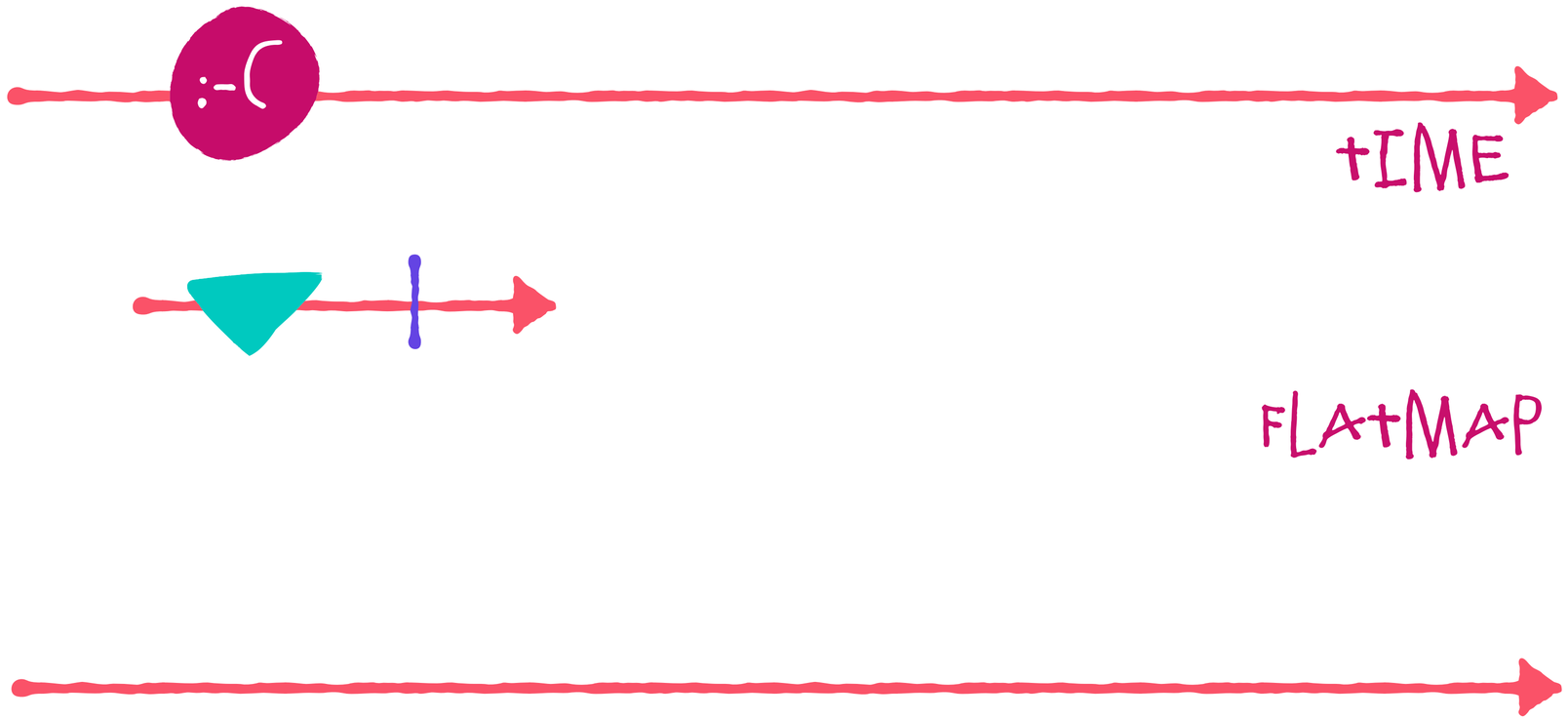
OPERATOR: FLATMAP()

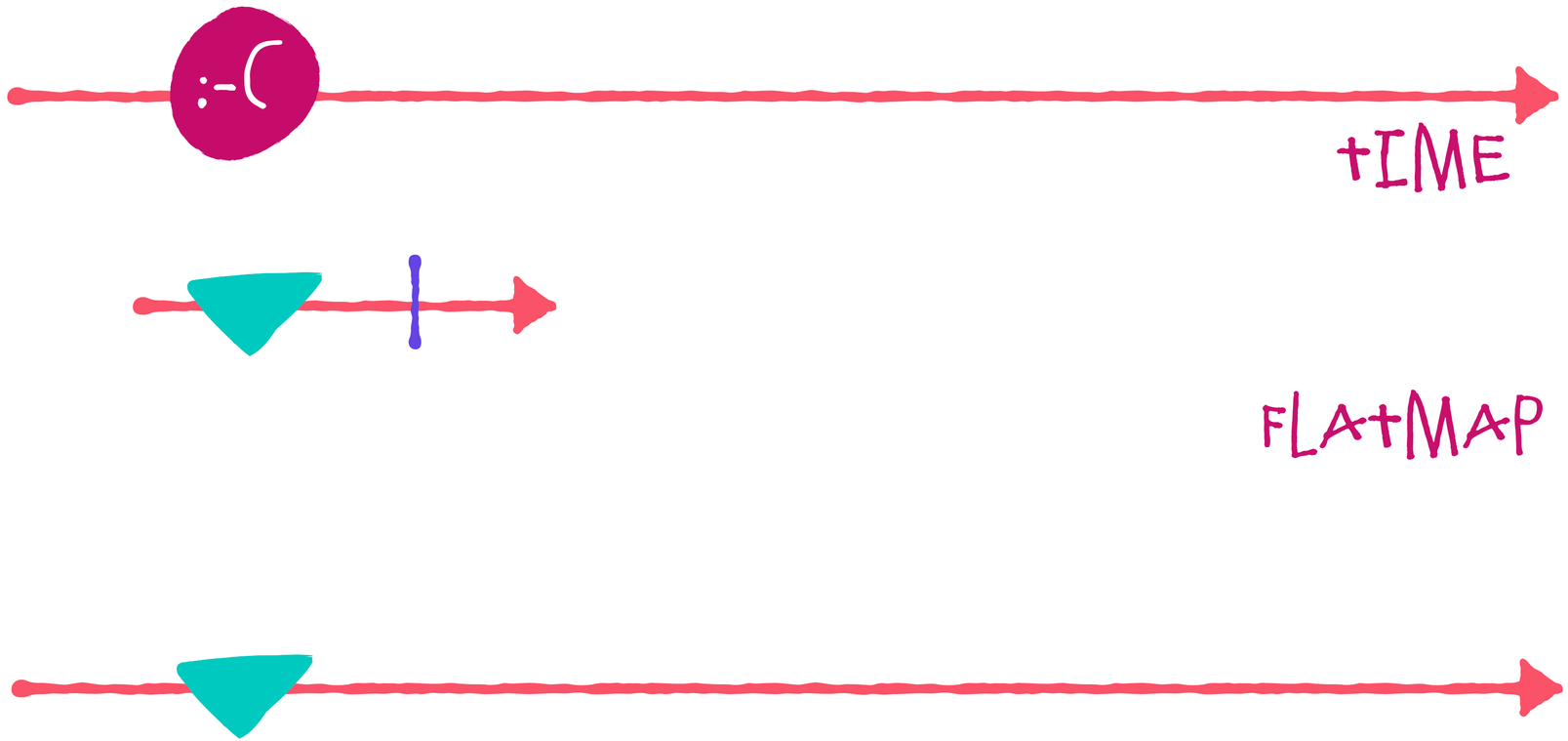
```
Observable.just( :-( , :-( )
        .flatMap( { Observable.just( 🔻 ) } )
        .subscribe { println(it) }
```

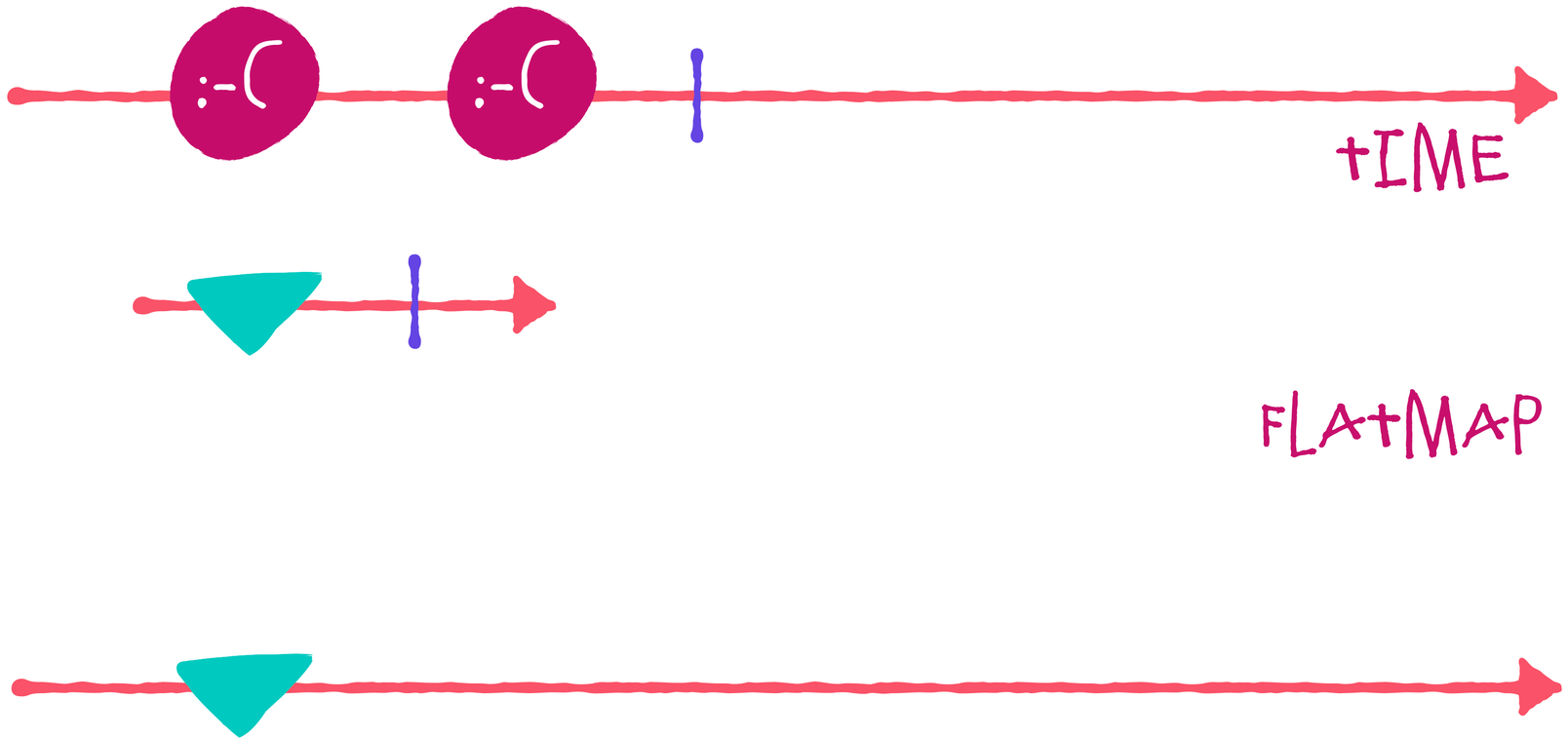

TIME
FLATMAP

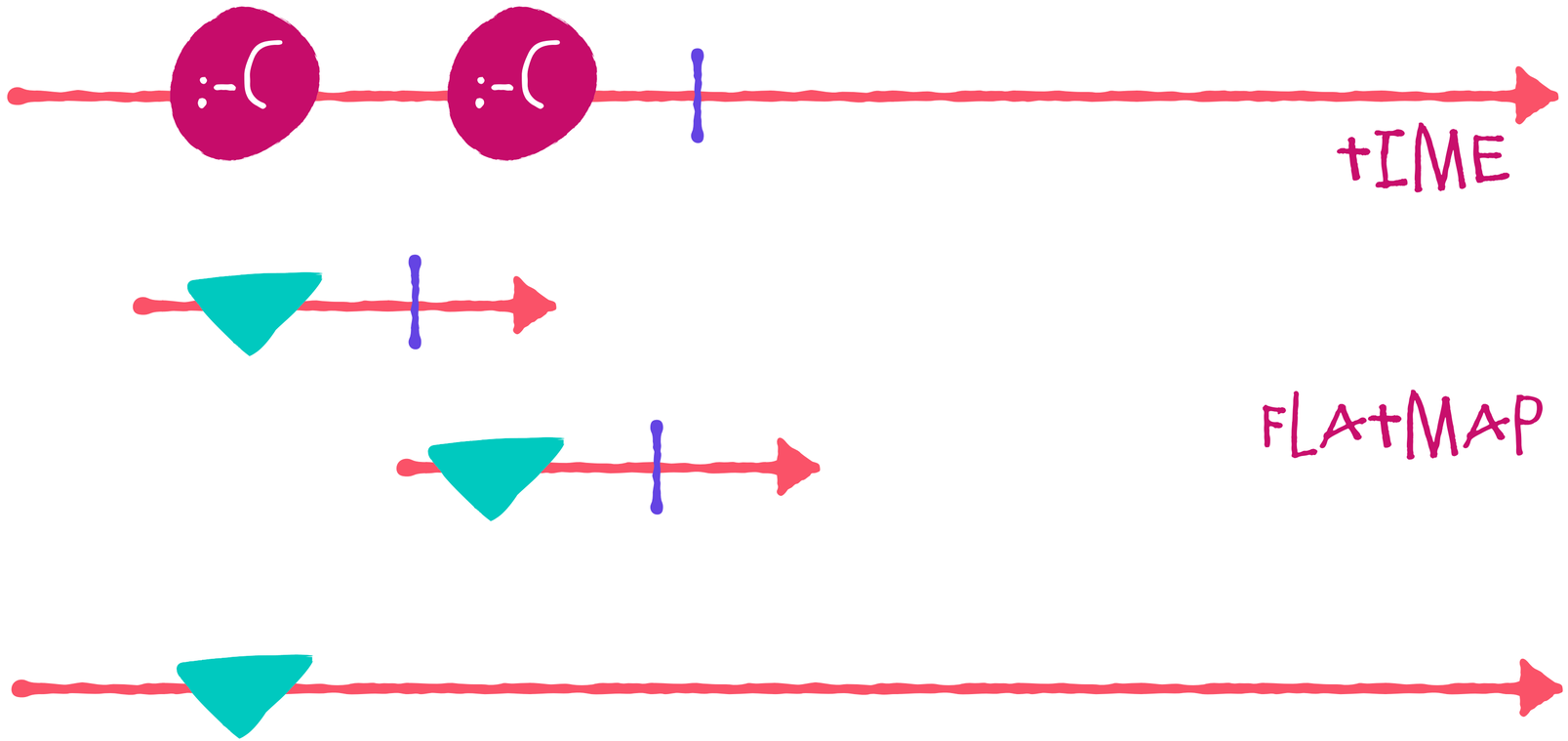


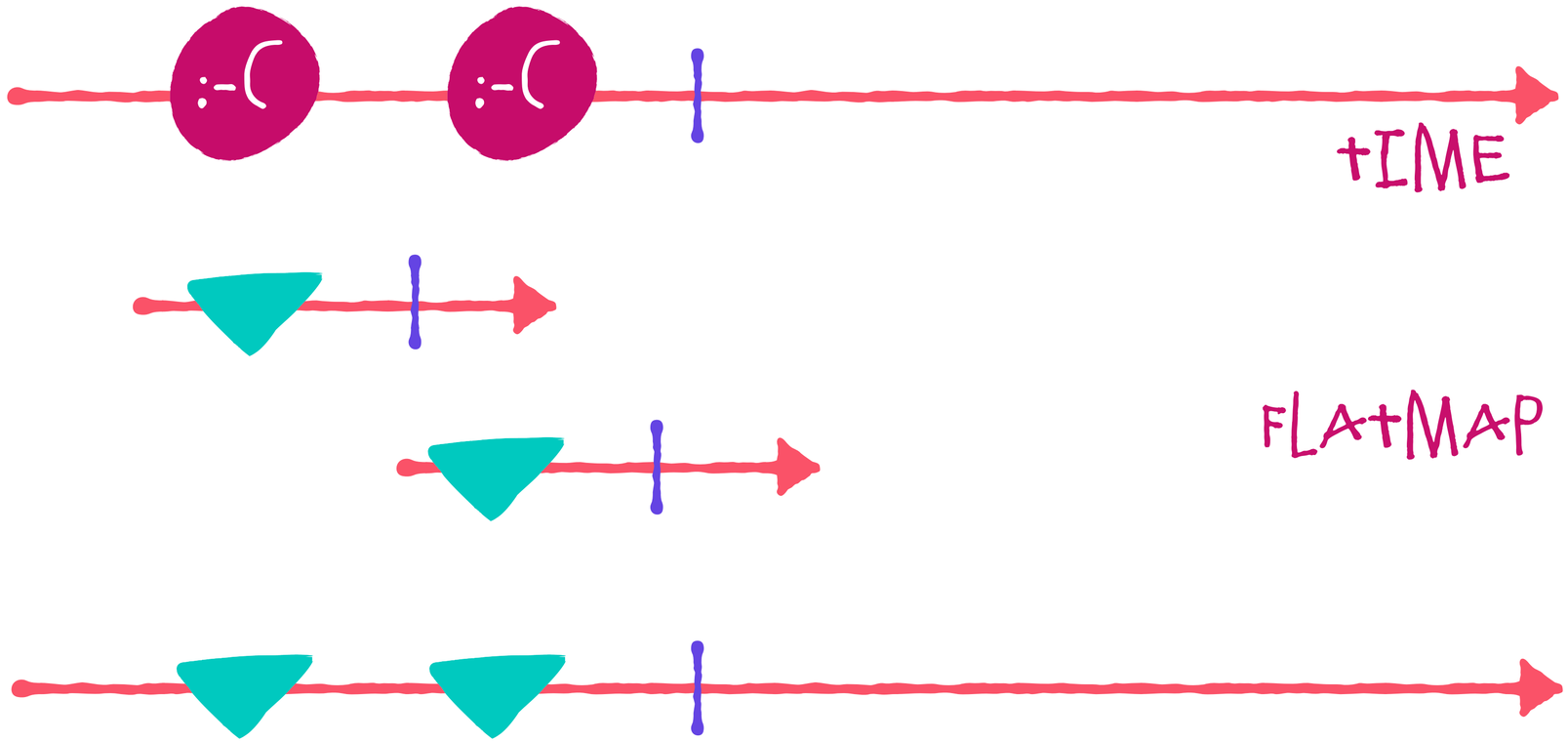
FLATMAP

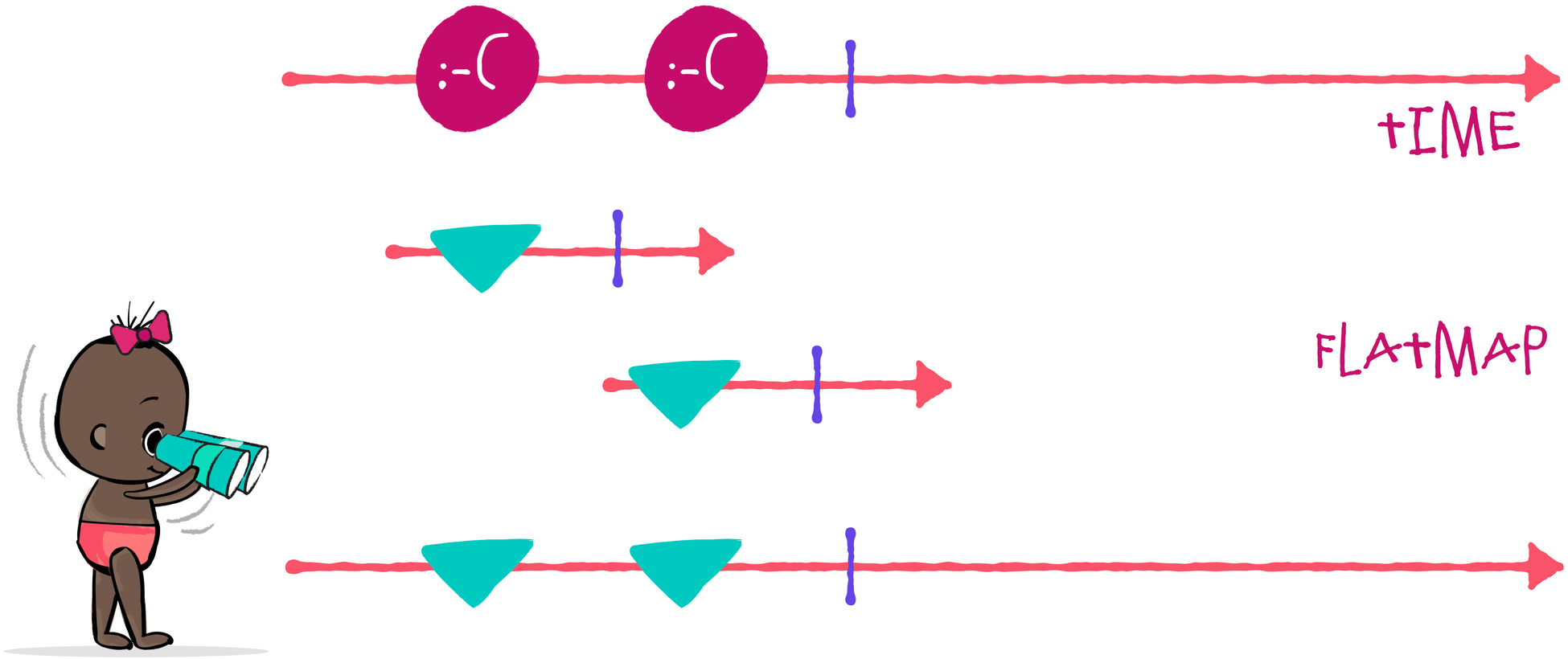

:-(
TIME
FLATMAP


:-(
TIME
FLATMAP


:-(
:-(
TIME
FLATMAP


:-(
:-(
TIME
FLATMAP


:-(
:-(
TIME
FLATMAP


:-(
:-(
TIME
FLATMAP

LONG RUNNING

ASYNCHRONOUS

OPERATOR: FLATMAP()

```
val users // Observable<User>
```

OPERATOR: FLATMAP()

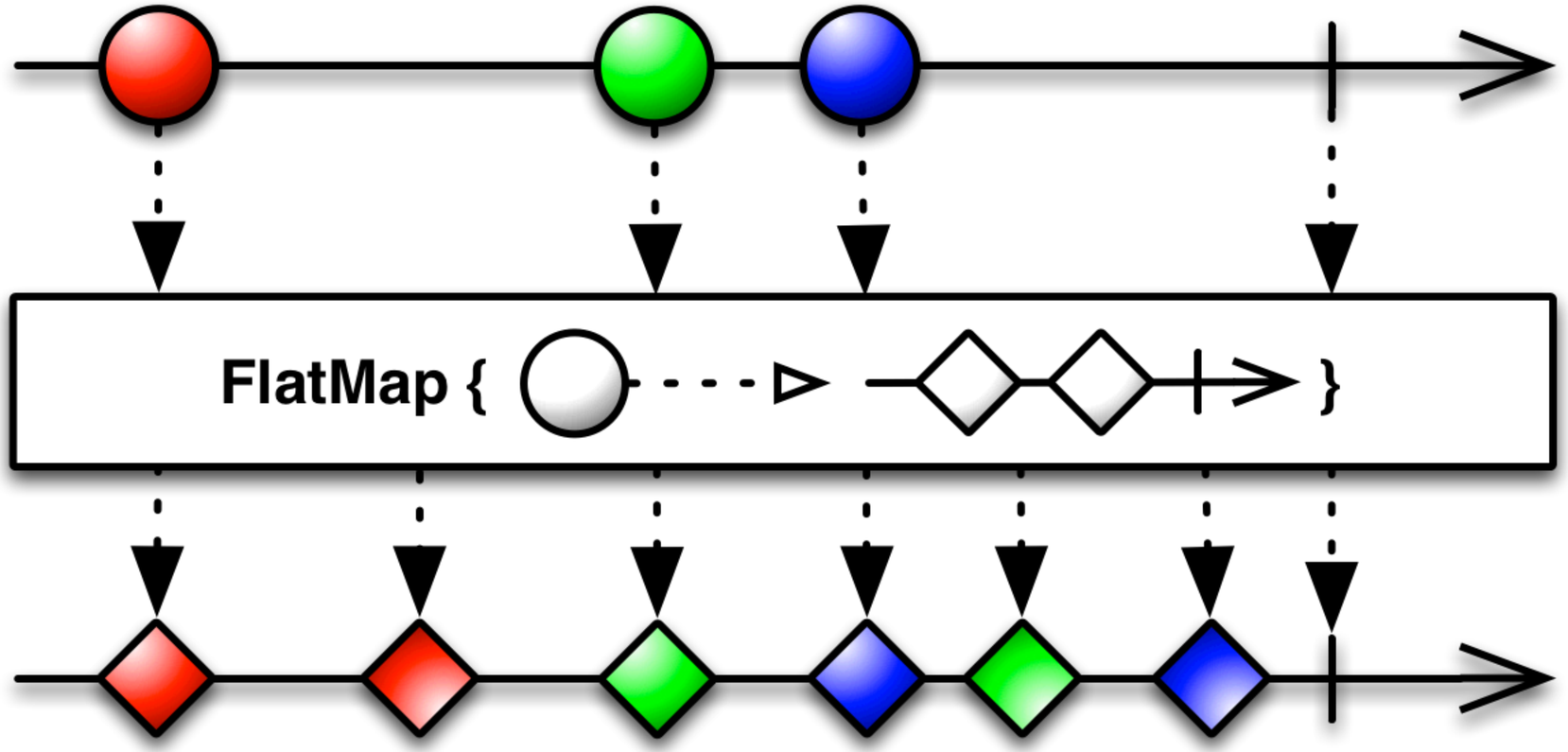
```
val users // Observable<User>
val posts: Observable<Post>
```

OPERATOR: FLATMAP()

```
val users // Observable<User>
val posts: Observable<Post>

posts = users.flatMap { getUsersPosts(it.id) }
```

OPERATOR: FLATMAP()

```
val users // Observable<User>
val posts: Observable<Post>

posts = users.flatMap { getUsersPosts(it.id) }
posts.subscribe { println(it) }
```



via reactivex.io

FLOWABLE

MAYBE

BACKPRESSURE

DISPOSABLE

COMPLETABLE

SINGLE

SHOULD YOU USE RXJAVA?

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- LIKE FUNCTIONAL PROGRAMING?
- PROCESS ITEMS ASYNCHRONOUSLY?
- COMPOSE DATA?
- HANDLE ERRORS GRACEFULLY?

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YES!

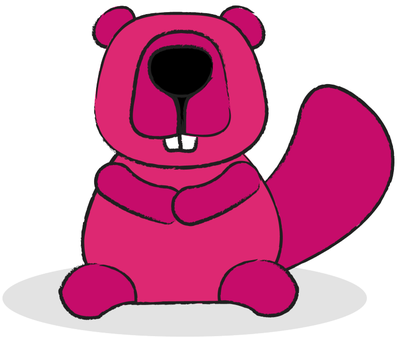
It
DEPENDS

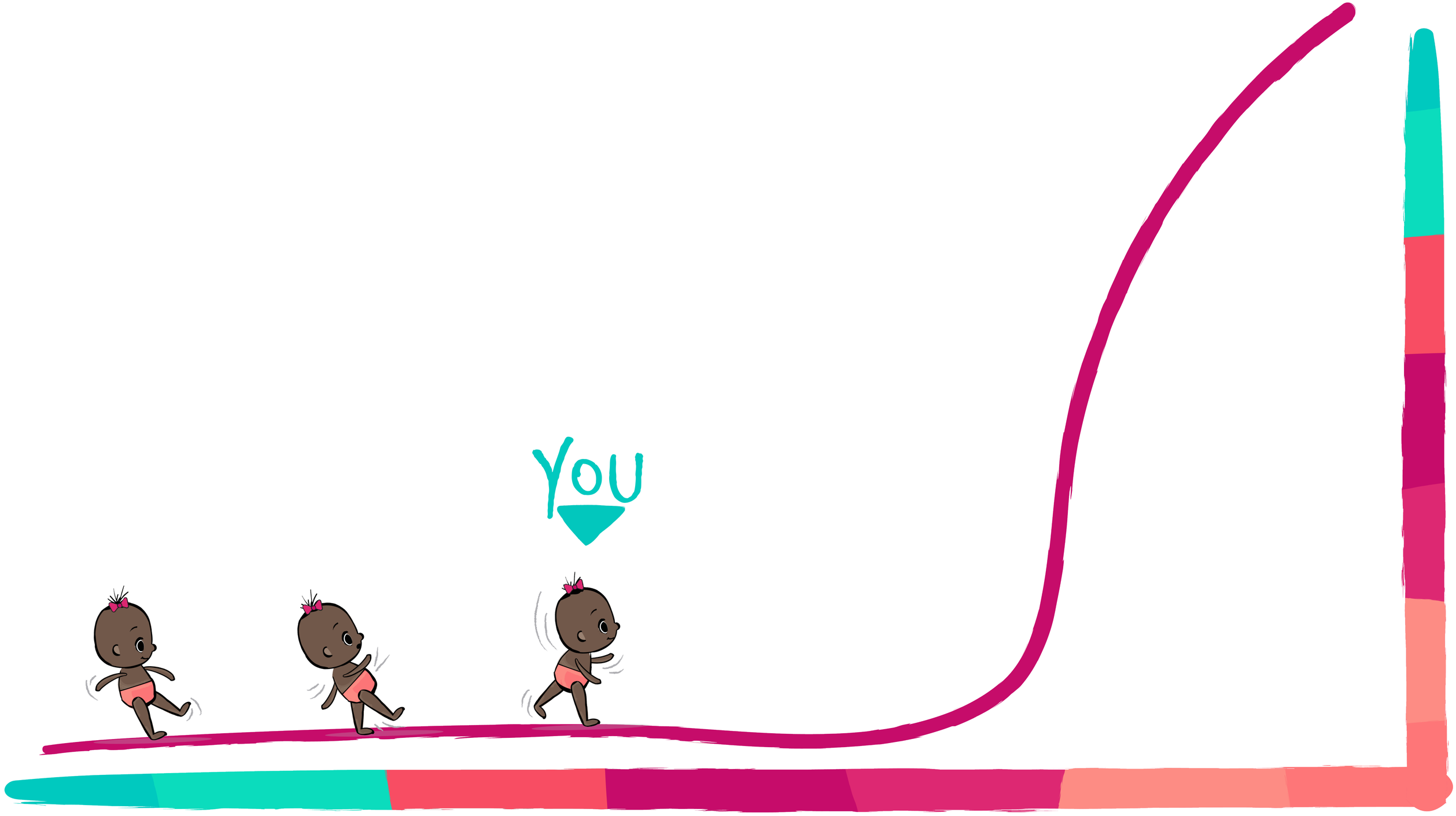
THE BASICS

OPERATORS

OBSERVER

OBSERVABLE




YOU

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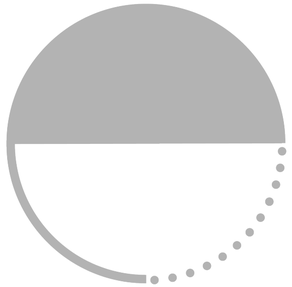
RESOURCES

- Reactive Programming on Android with RxJava (http://amzn.to/2yOAkxn)
- Reactive Programming with RxJava (http://amzn.to/2zQtqb5)
- RxJava Playlist (https://goo.gl/9fw1Zv)
- Learning RxJava for Android Devs (https://goo.gl/VWxFLK)
- RxJava Video Course (https://caster.io/courses/rxjava)

SLIDE DESIGN:



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