Information Visualization Marks & Channels

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https://www.cs.ubc.ca/~tmm/courses/547-20

Plan for today

- ~~15~~ 30 min: mini-lecture w/ discussion of examples
- 30 min: breakout groups
- 20 min: reportbacks
- ~~10 min: wrapup w/ further examples~~

Reminder: Marks and channels

- **marks**
  - basic geometric elements

- **channels**
  - control appearance of marks

→ Points　　　→ Lines　　　→ Areas
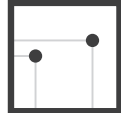
→ Position　　　→ Color

　→ Horizontal　　→ Vertical　　→ Both

→ Shape　　　→ Tilt

→ Size

　→ Length　　　→ Area　　　→ Volume

Channels: Rankings

Position on common scale

Position on unaligned scale

Length (1D size)

Tilt/angle

Area (2D size)

Depth (3D position)

Color luminance

Color saturation

Same

Curvature

Same

Volume (3D size)
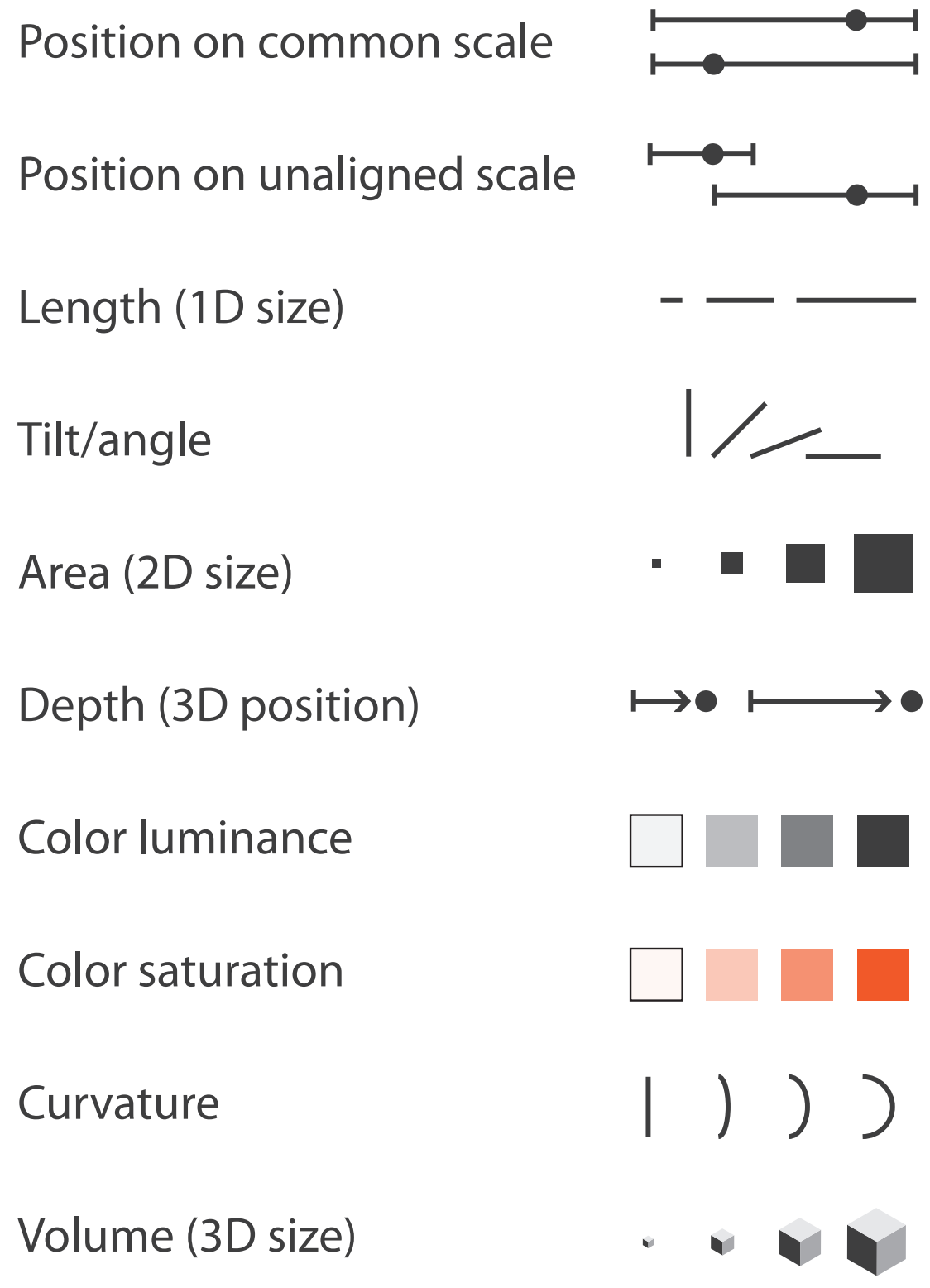
Best

Effectiveness

Least

→ **Identity** Channels: **Categorical** Attributes

Spatial region

Color hue
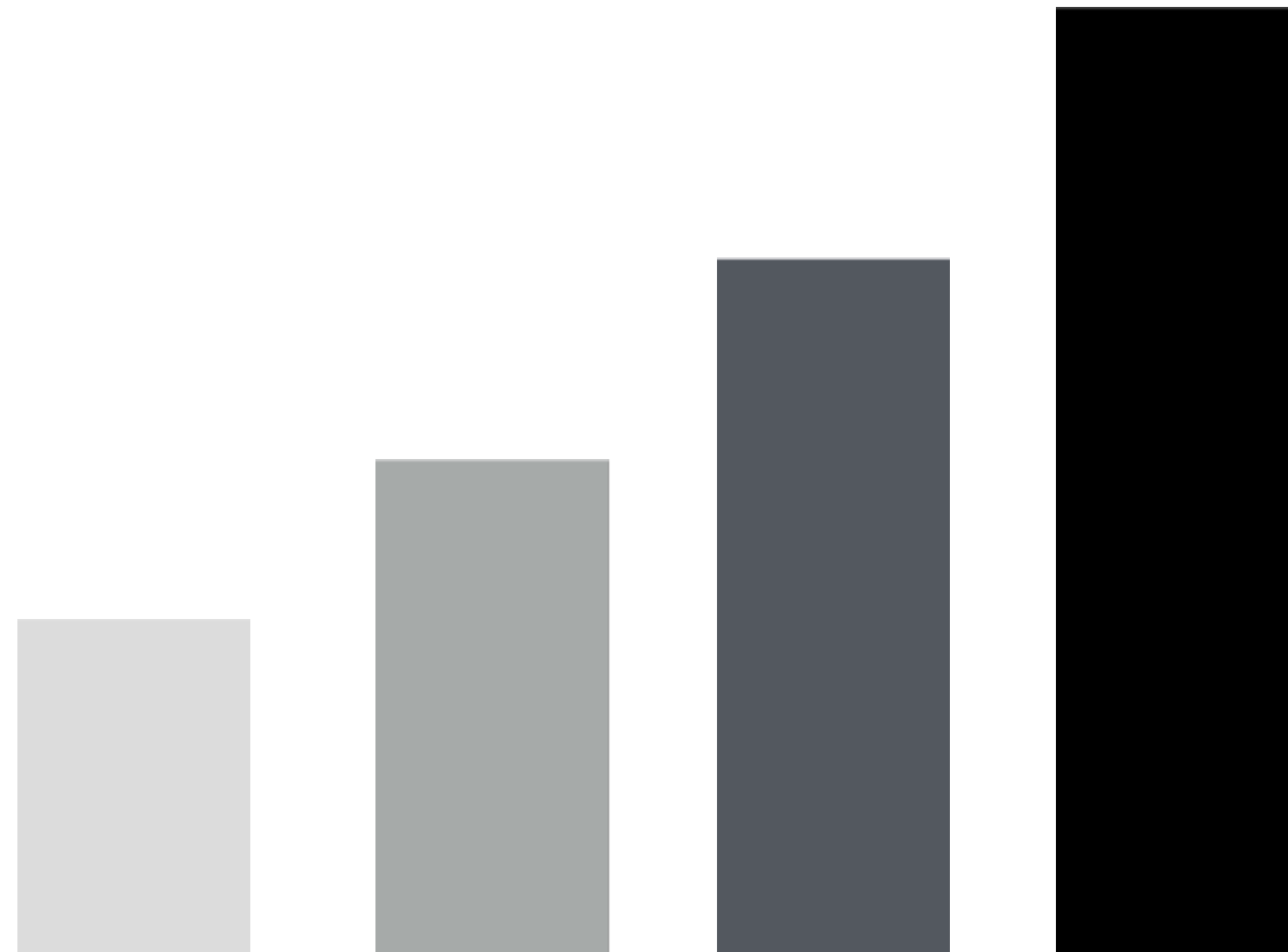
Motion

Shape

- expressiveness
  - match channel and data characteristics
- effectiveness
  - channels differ in accuracy of perception
- distinguishability
  - match available levels in channel w/ data

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Redundant encoding

- multiple channels
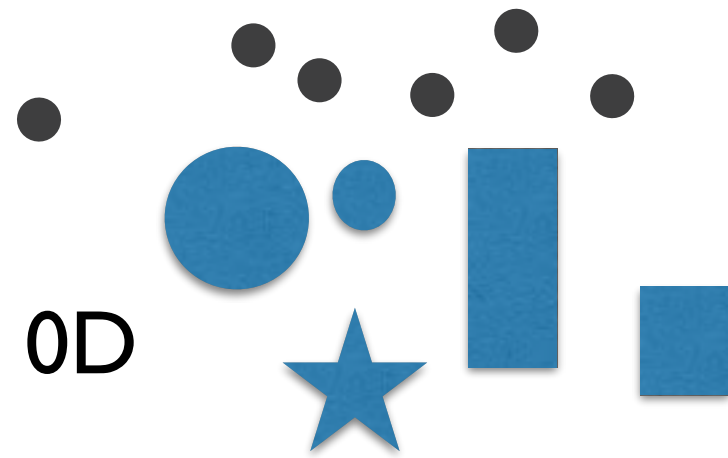 - sends stronger message
  - but uses up channels
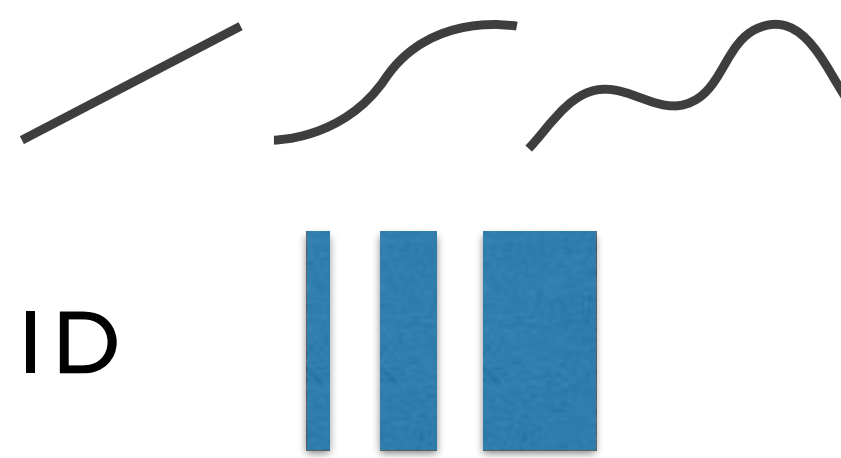
Length, Position, and Value

Marks: Constrained vs encodable

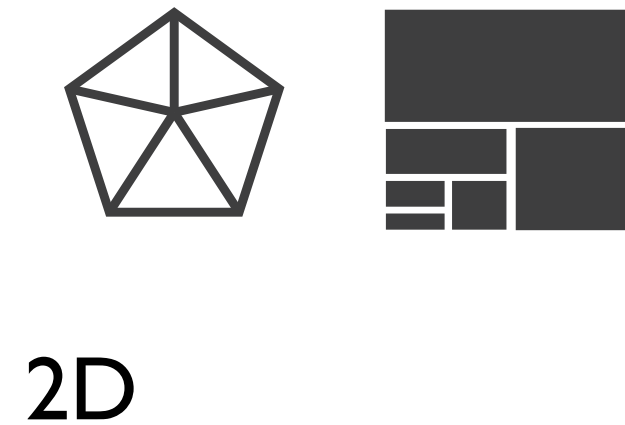- math view: geometric primitives have dimensions

→ Points → Lines → Areas

0D   ID   2D

- constraint view: mark type constrains what else can be encoded
  - points: 0 constraints on size, can encode more attributes w/ size & shape
  - lines: 1 constraint on size (length), can still size code other way (width)
  - areas: 2 constraints on size (length/width), cannot size code or shape code
    - interlocking: size, shape, position
- quick check: can you size-code another attribute, or is size/shape in use?
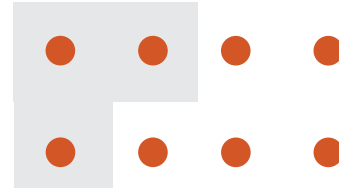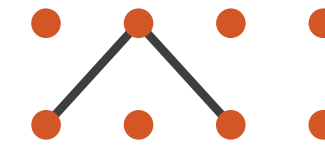
Grouping

- containment

- connection

- proximity
  - same spatial region

- similarity
  - same values as other categorical channels

Marks as Links

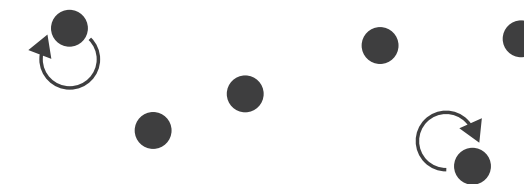→ **Containment**   → **Connection**

→ **Identity** Channels: **Categorical** Attributes
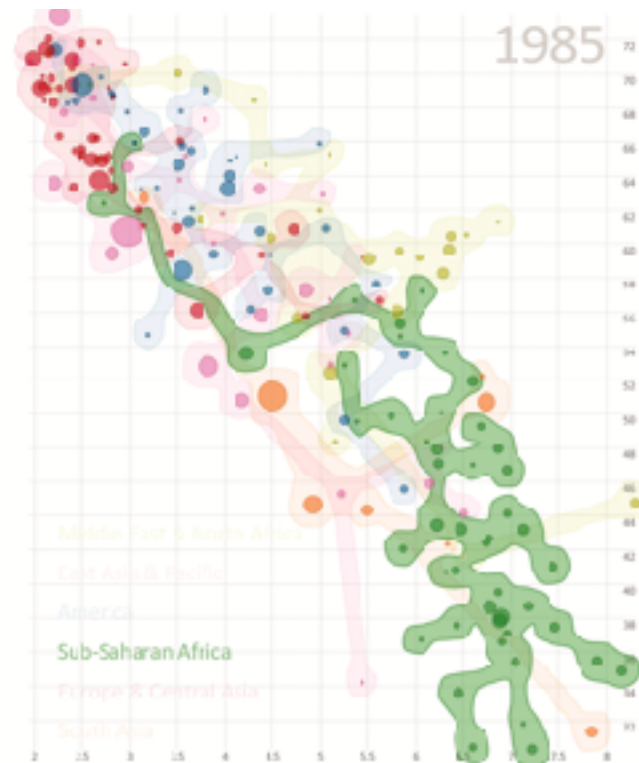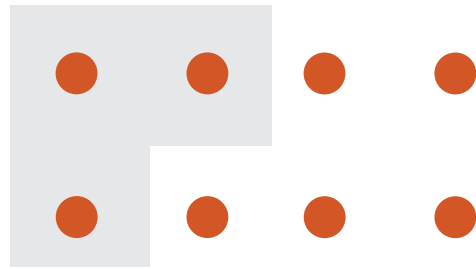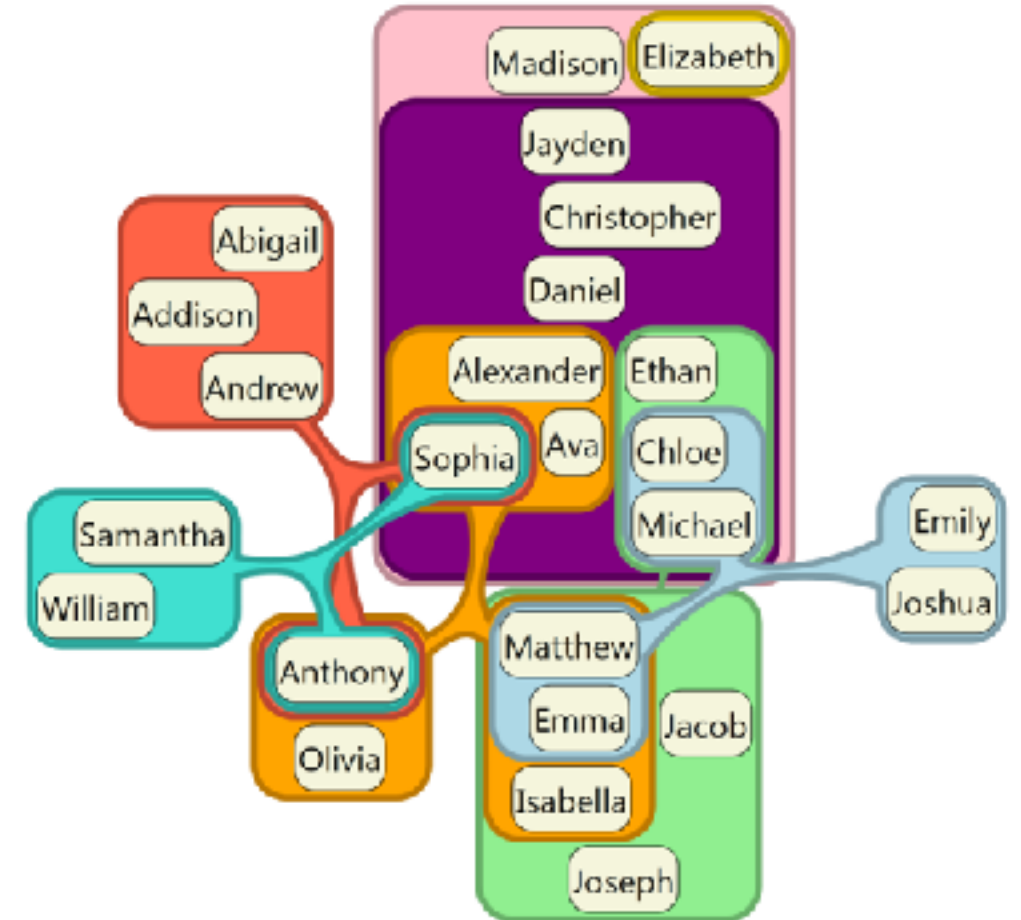
Spatial region

Color hue

Motion

Shape

Marks for links

→ Connection
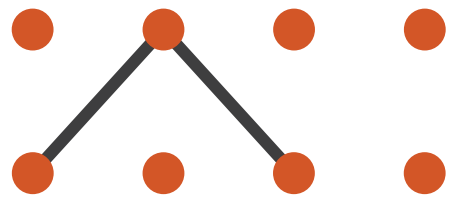
→ Containment

Containment can be nested
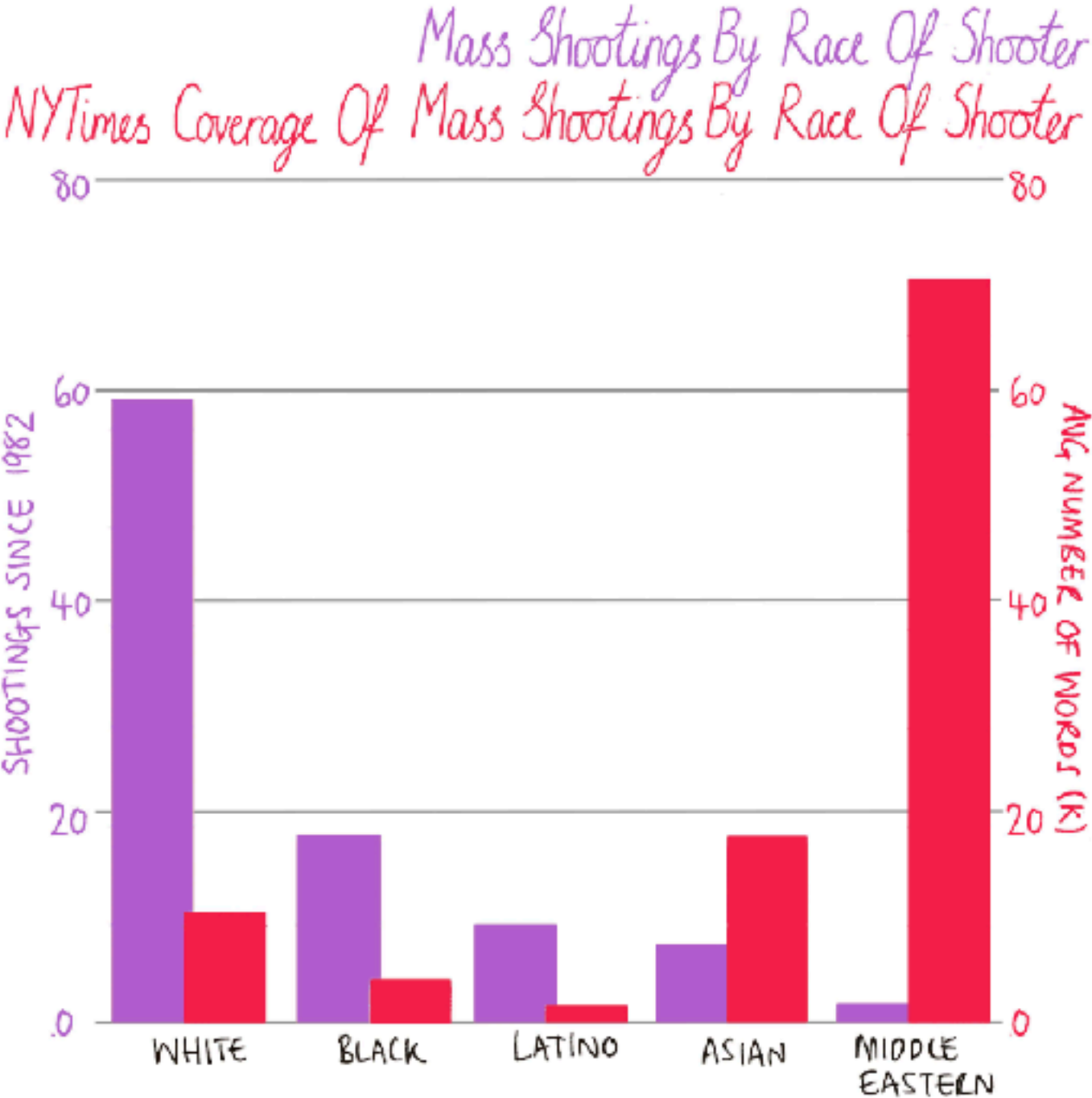
[Untangling Euler Diagrams, Riche and Dwyer, 2010]

Quiz: Name those marks & channels

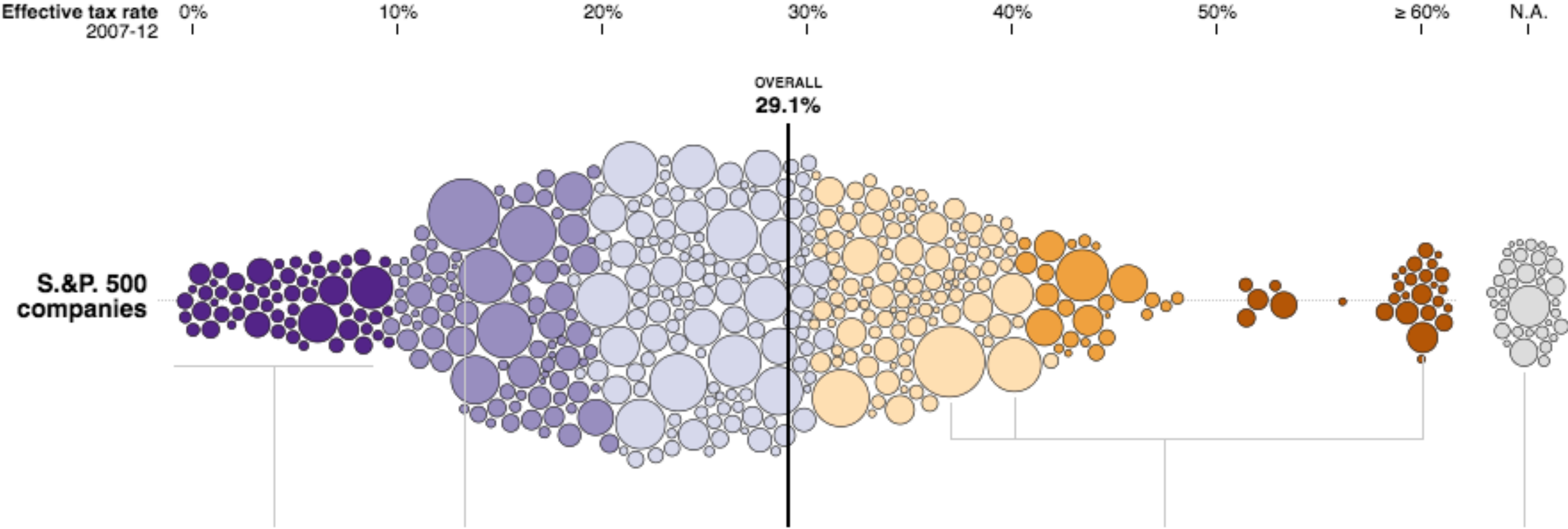- A: Shooting Media Coverage

Mass Shootings By Race Of Shooter

NYTimes Coverage Of Mass Shootings By Race Of Shooter

https://twitter.com/MonaChalabi/status/1158779046693679106?s=20

Quiz: Name those marks & channels

- B: Tax Rates

Quiz: Name those marks & channels

- C: Sunsqatch

Sunsquatch
Best spots to see the eclipse
and bigfoot... at the same time!

Data: Bigfoot Field Researchers Organization I NASA Scientific Visualization Studio

https://flowingdata.com/2017/08/20/sunsquatch-the-only-eclipse-map-you-need/
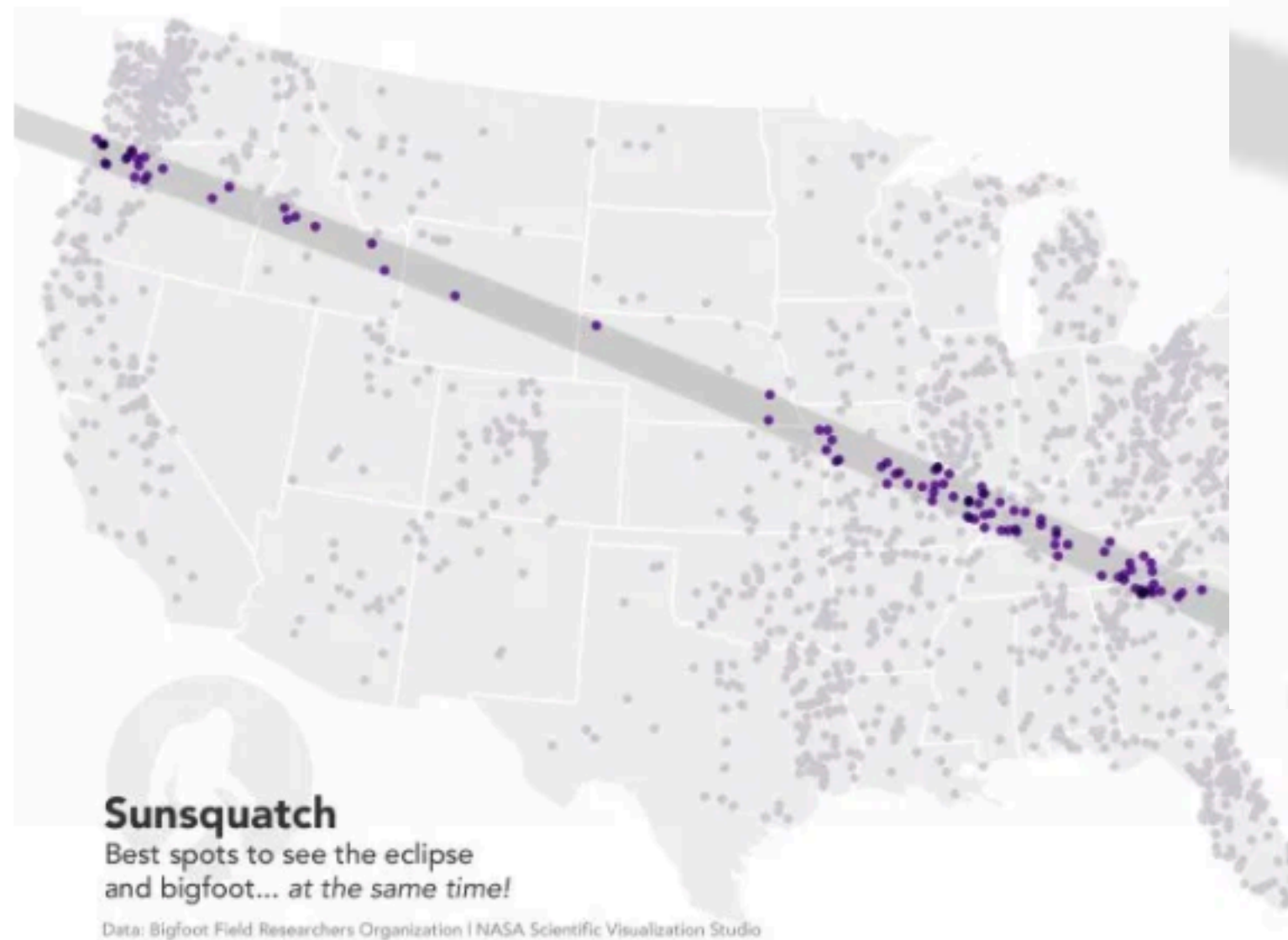
Quiz: Name those marks & channels

- D: UFC fights

Most TKO's from punches occur in the first match on a fight night

UFC fights from 1993 to 2018

Submission: armbar

Knockout

Fight

Nov,1993

FIGHTS PER EVENT
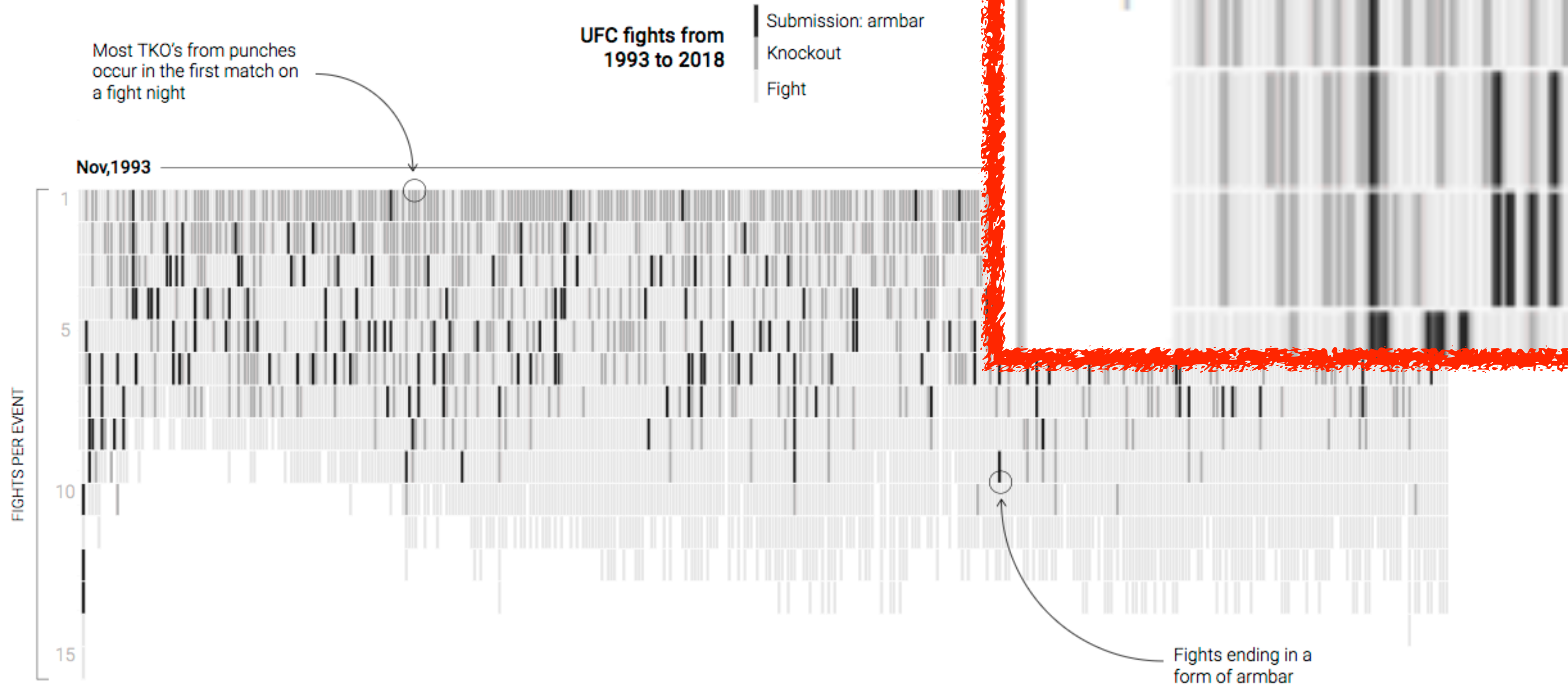
Fights ending in a form of armbar

Analyzing marks

- what type of mark?
  - line?
    - no, not length coded
  - point mark with rectangular shape?
    - yes!
  - area?
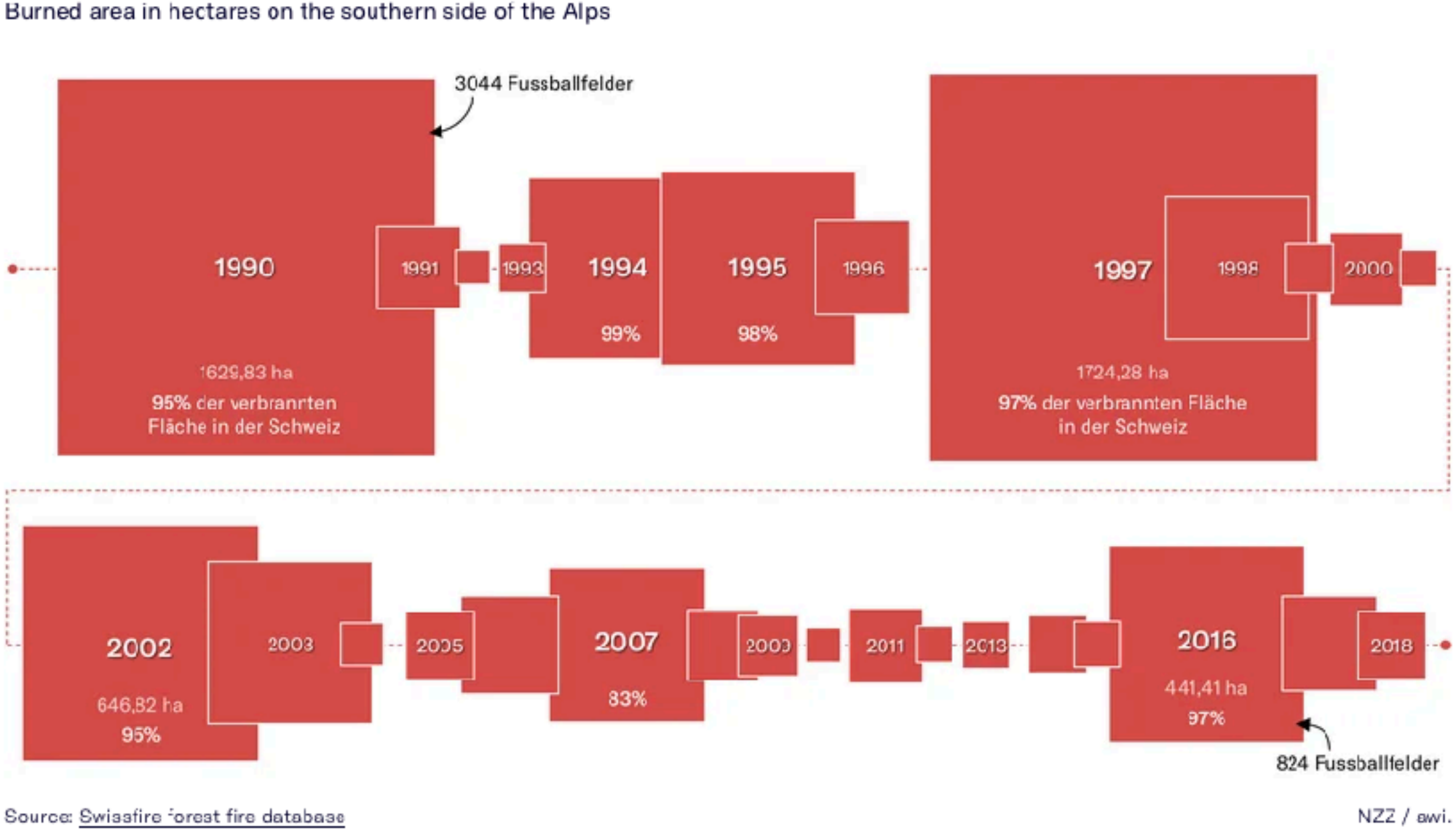   - no, area/shape does not convey meaning

Nov,1993

https://multimedia.scmp.com/infographics/sport/article/3010883/bruce-lee-and-mixed-martial-arts/index.html

Quiz: Name those marks & channels

- E: Alpen Forest Fires

Burned area in hectares on the southern side of the Alps

Source: Swissfire forest fire database

NZZ / awi.

Quiz: Name those channels
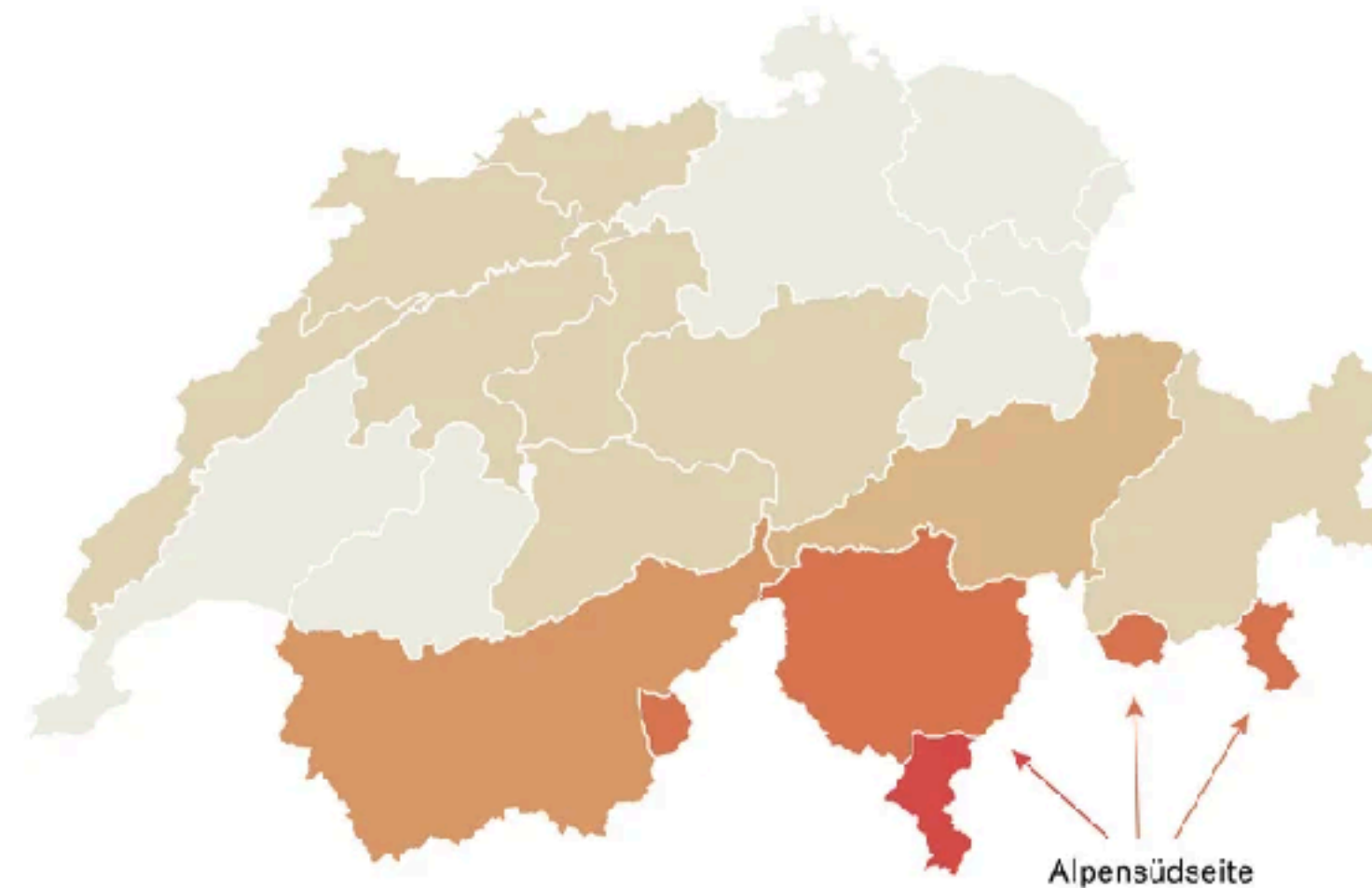
- F: Netherlands Commuters
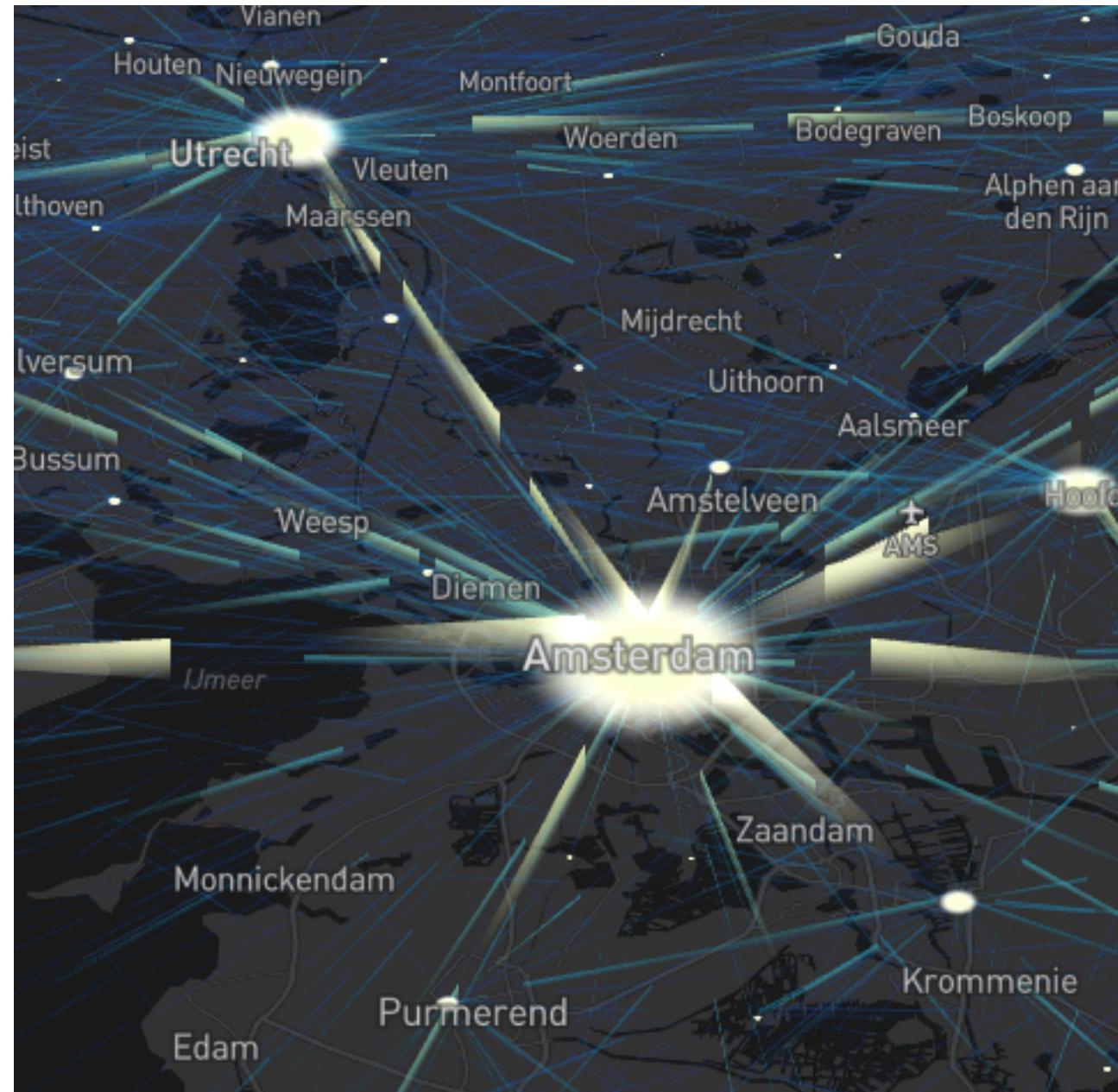
Quiz: Name that mark

- G: Yet More Alpen Forest Fires

Most forest fires in Switzerland occur on the southern side of the Alps. , ,

Annual number of forest fires between 1990 and 2014

< 1 Waldbrand   1–2   2–3   3–5   5–15   > 15

Alpensüdseite

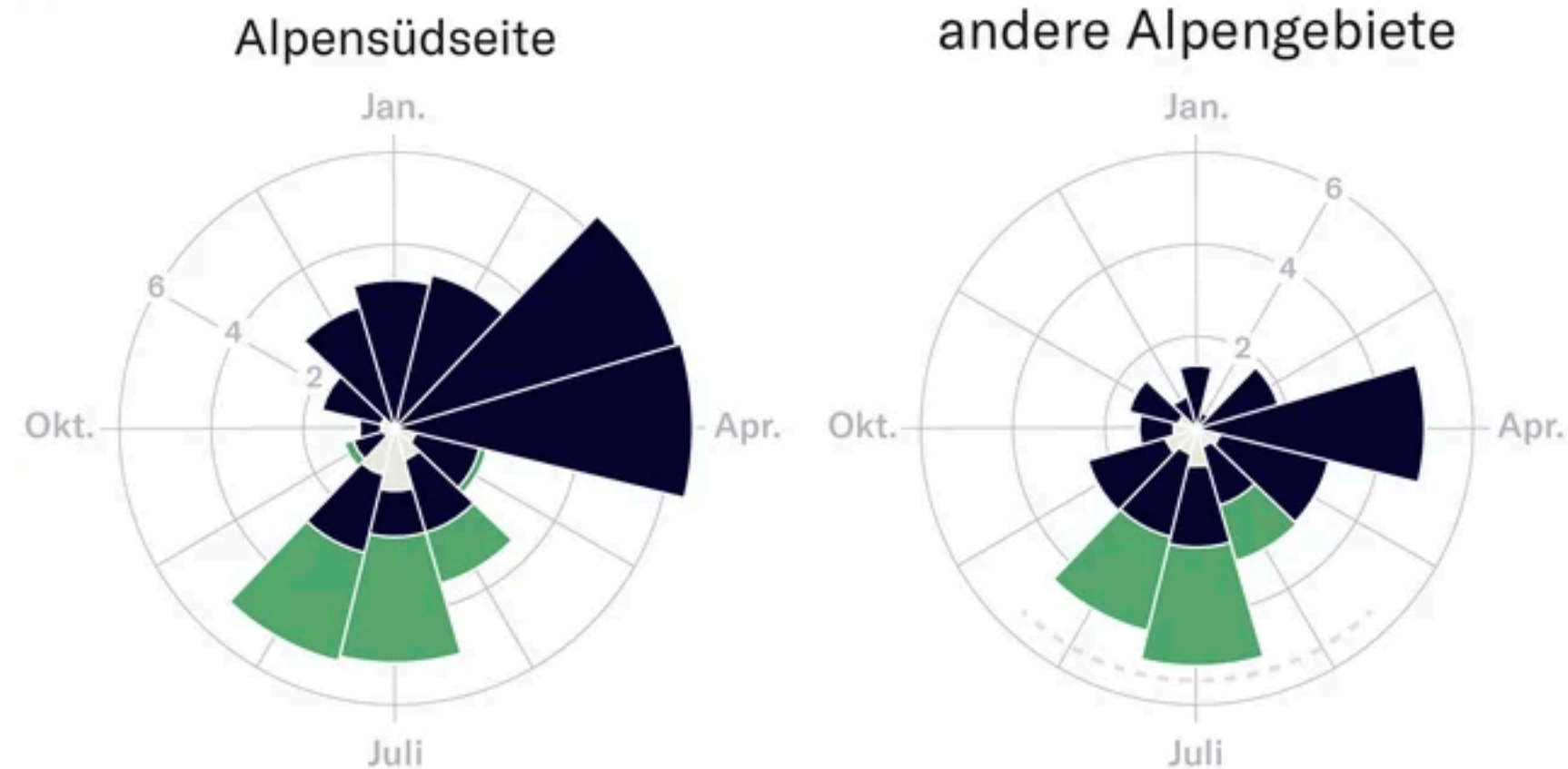Source: Climate Change Forest, Pluess et al., 2016   NZZ / awi.

Quiz: Name those marks & channels

- H: More Alpen Forest Fires

Monthly distribution of forest fires in the Alpine regions caused by. , ,

● den Menschen ● Blitzschläge ○ unbekannt

Alpensüdseite

andere Alpengebiete

Average numbers in the period 2000-2018
Source: Swissfire forest fire database

NZZ / awi.

https://www.nzz.ch/wissenschaft/waldbraende-erklaert-in-der-schweiz-und-in-europa-ld.1483688