

Cognitive capacity:

You don't always see what's in front of you and what we can do about that.

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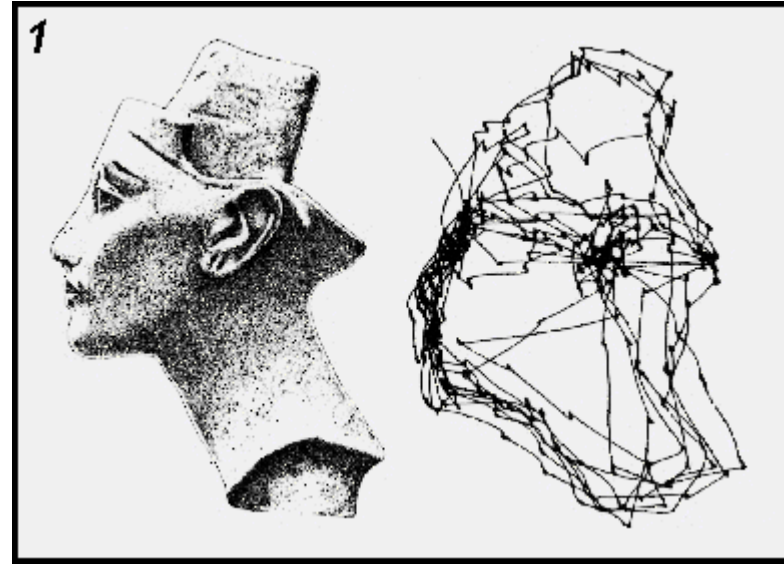
Joshua Sarmir

Founder and CEO, SplitSage
splitsage.com



You are sipping at the outside world through a straw.

Your eyes are constantly darting around ($\sim 4/\text{sec}$), taking in the visual scene in *small pieces*.



Eye traces from a person looking at these pictures

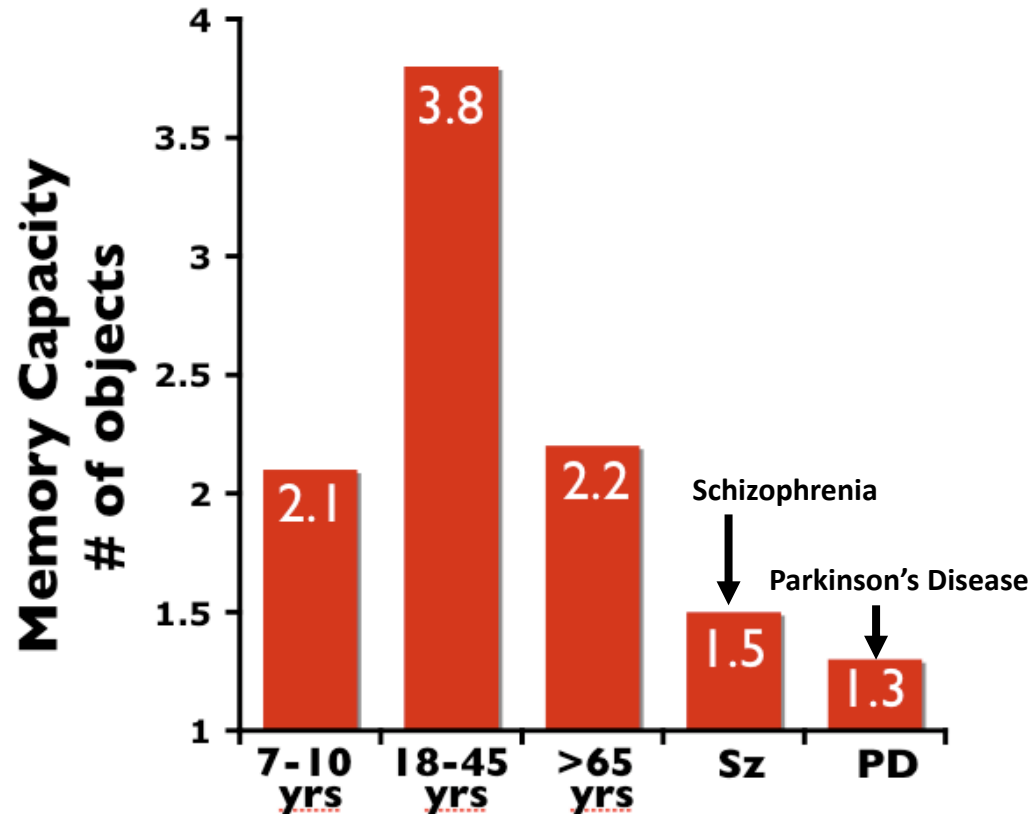
Your brain pieces together these small snapshots into an *illusion* of a visual scene in which you clearly perceive everything simultaneously.

The reason is because of severe limitation in processing bandwidth

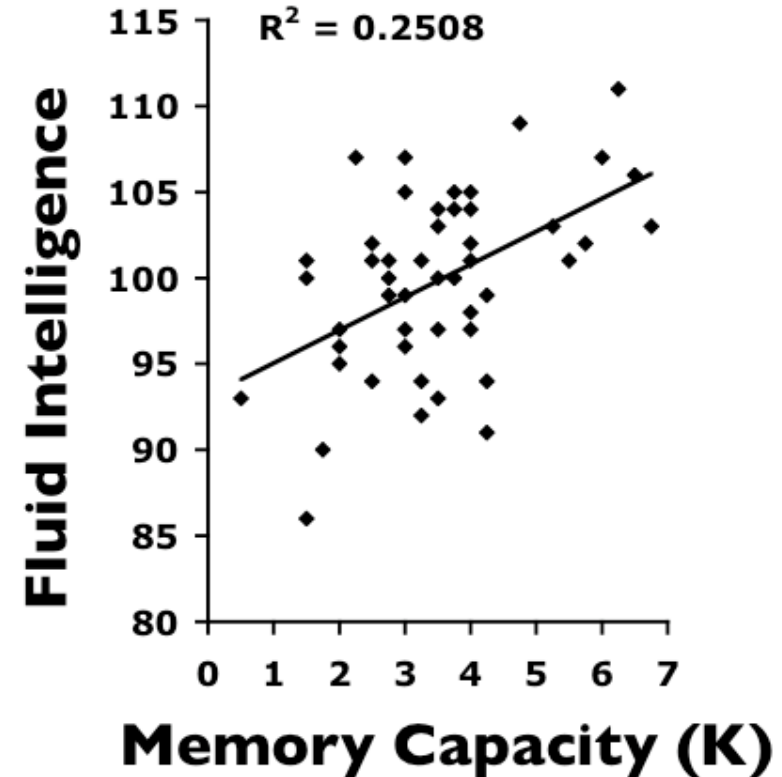
The average adult human can only process about 4 things at the same time (range = 2-8)

This is called *cognitive capacity*.

Capacity is highest in younger adults and reduced in many neuropsychiatric disorders



It correlates highly with tests of intelligence
It is the bandwidth of cognition

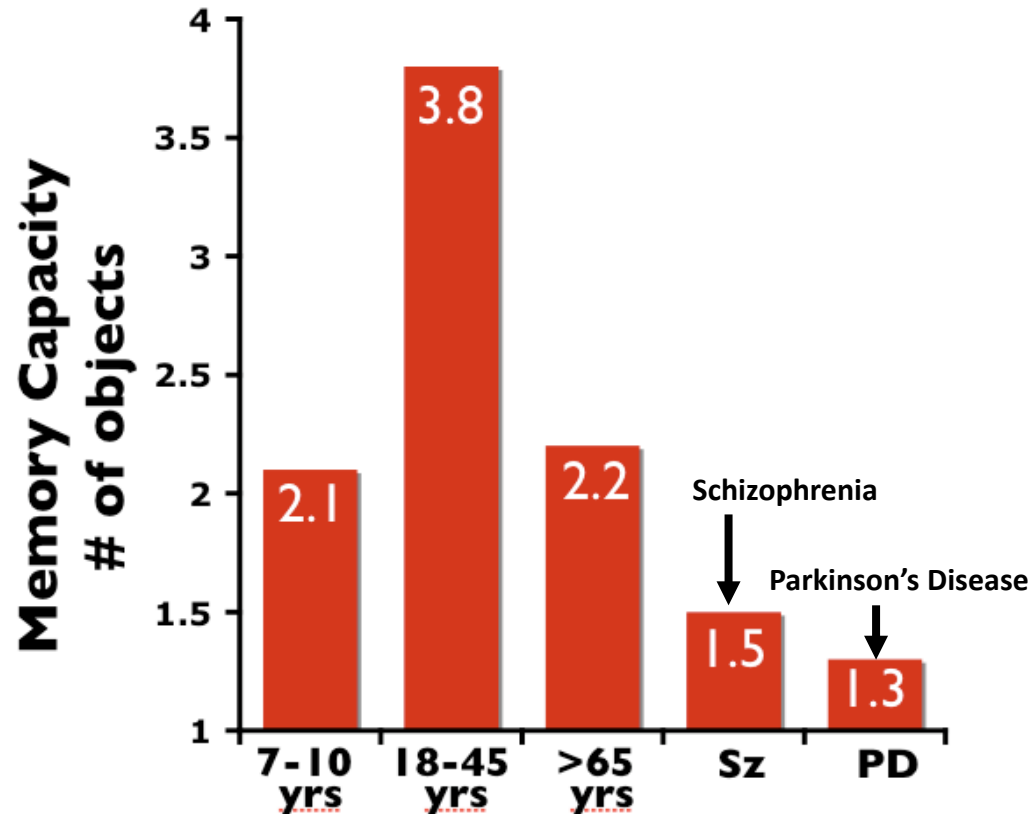


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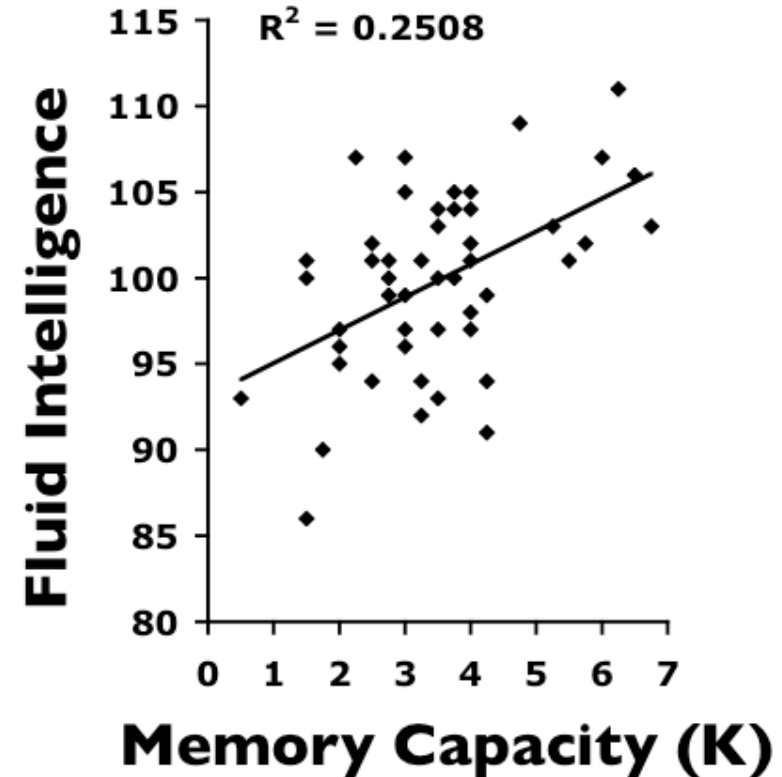
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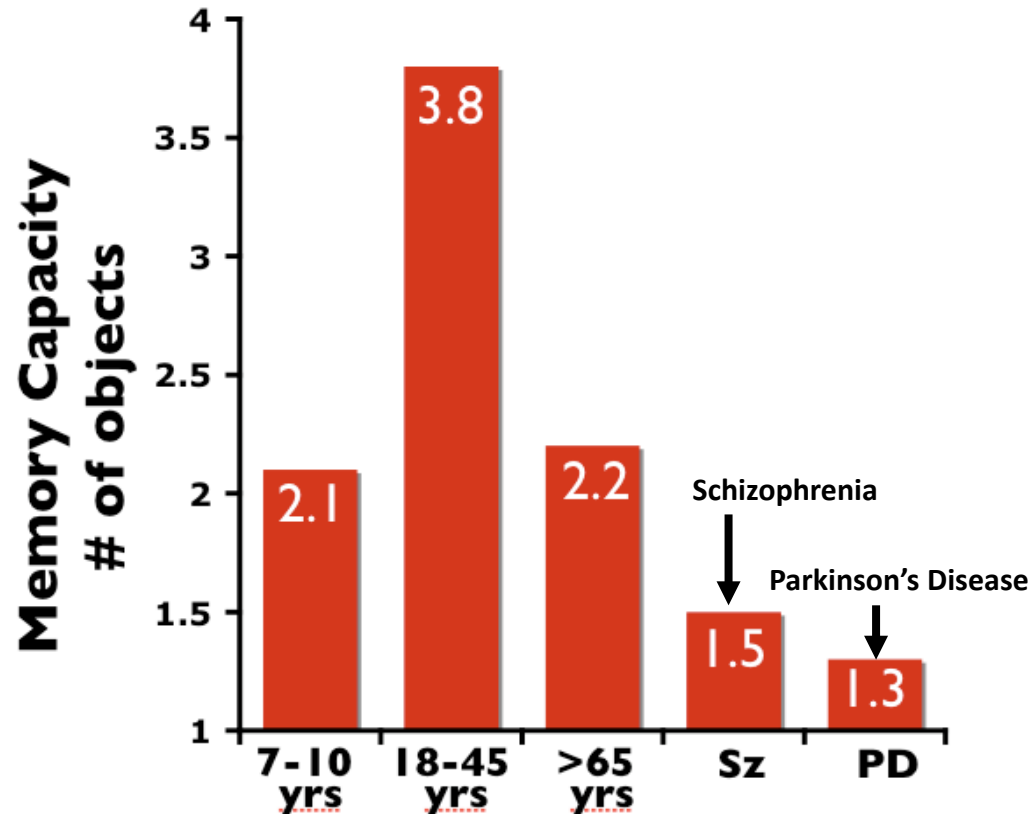


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This is called *cognitive capacity*.

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Don't believe me?
Let's take a test!







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In fact, you have separate capacities on the right and left sides of visual space.

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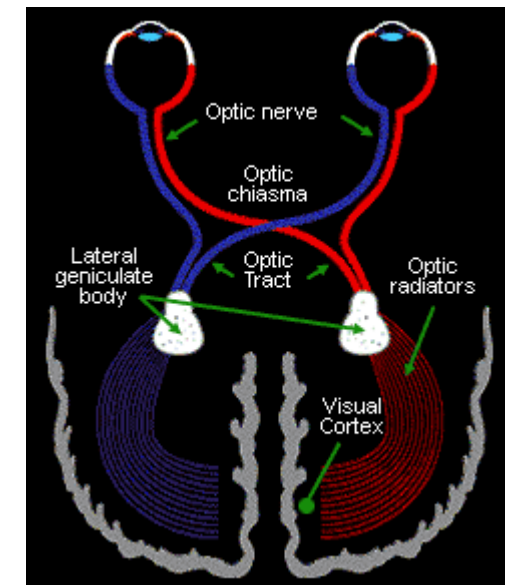
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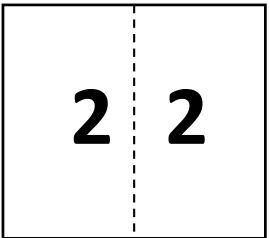
This is because the right and left sides of each eye send separate projections to your left and right brain. Your right brain sees the left half of space and your left brain sees the left half.

It has been assumed for decades that your brain integrates left and right space into one overall capacity.

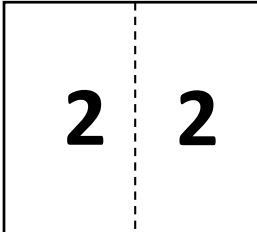
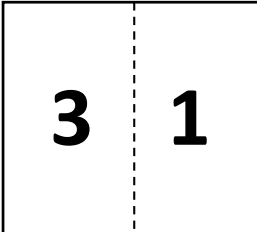
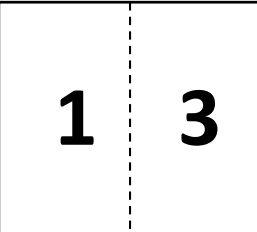
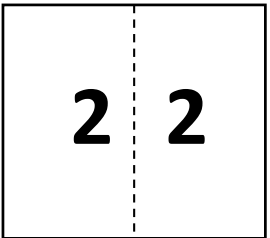
But we found that it doesn't!



People don't have an (average) capacity of four. They have a capacity of two on the right and two on the left

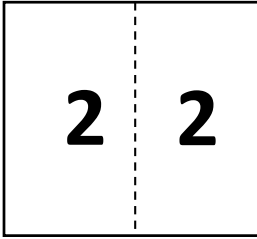
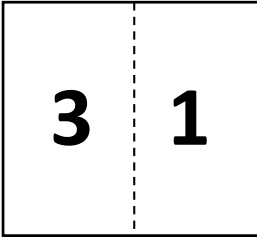
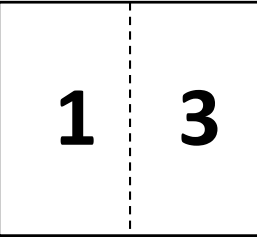
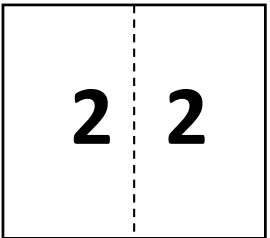


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But wait, there's more!
It turned out that different people have different capacities on the right and left.

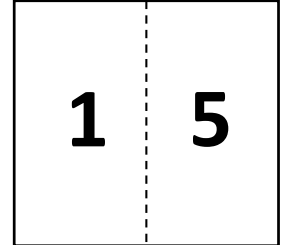
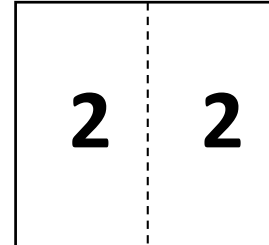
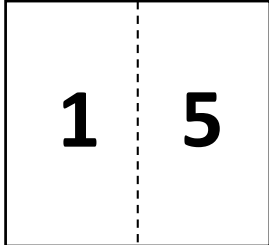
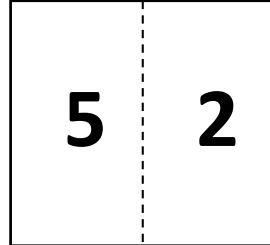
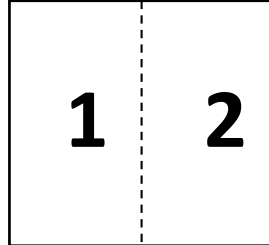
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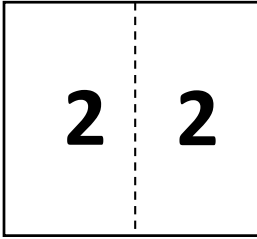
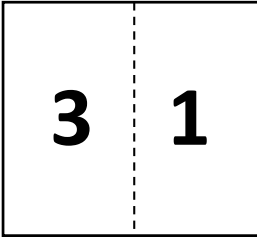
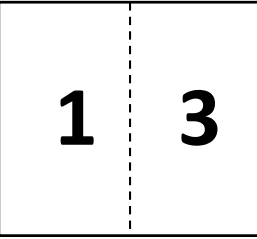
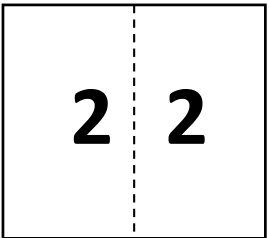
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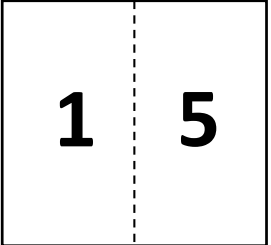
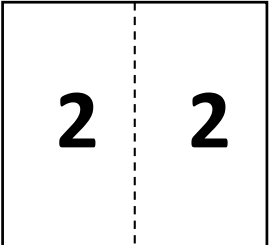
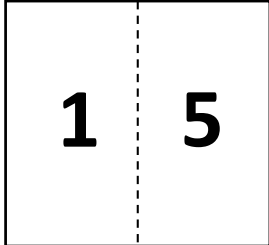
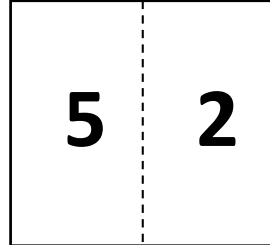
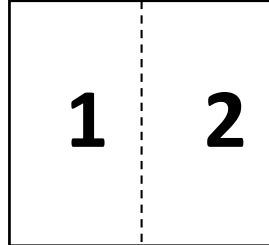


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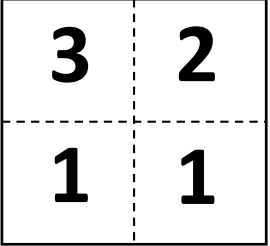
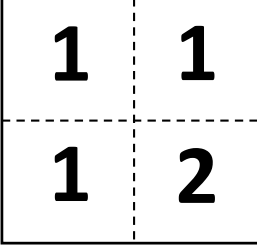
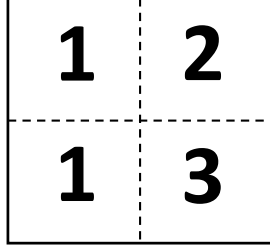
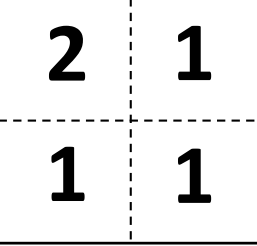
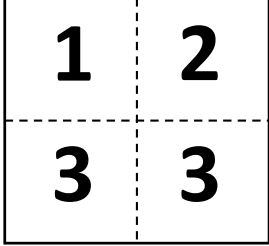
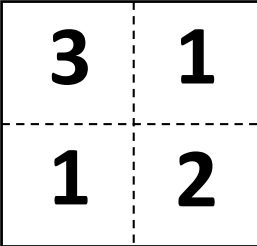
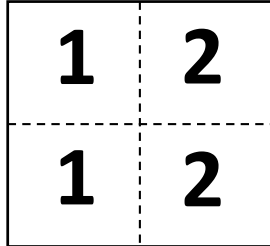


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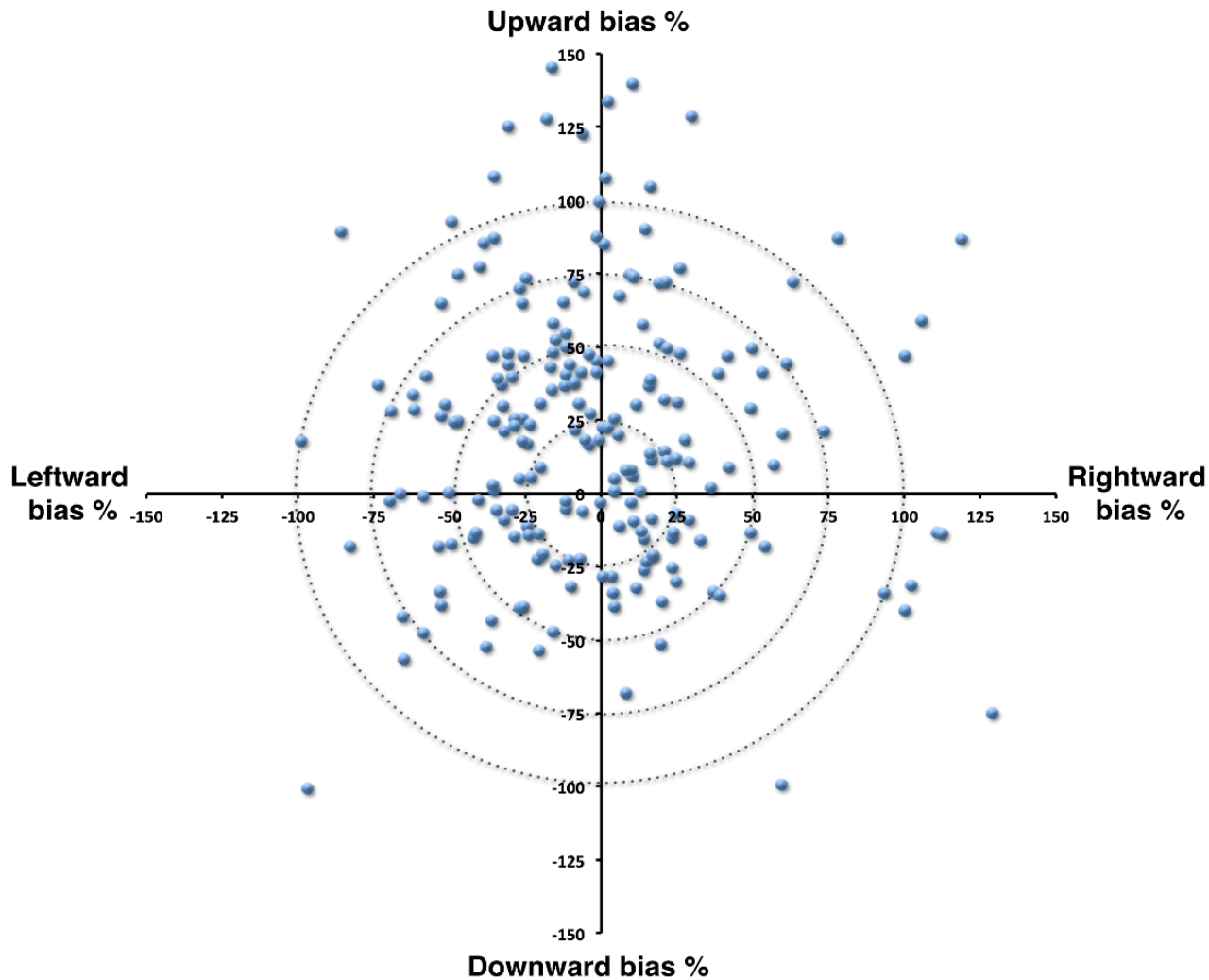
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But wait, there's even more! We also found an up vs down bias.



These effects are huge!



Visual capacity bias for 227 adults. The dots indicate which visual quadrants, if any, have a greater bandwidth (example). For example, a dot in the upper left indicates that subject had a greater bandwidth in the upper left quadrant. The distance from the center indicates the strength of the bias.

For example, if an individual had a capacity of two items on the left side and four on the right then they would have a horizontal bias score of 100%.

In the **horizontal** dimension, over **80% of subjects** had a bias of greater than 10%. **49% of subjects** had a bias of 25% or more. In the **vertical** dimension, over **85% of subjects** had a bias of greater than 10% **63% of subjects** had a bias of at least 25%.



Increase Effectiveness. Improve Safety. Enhance Performance

SplitSage has developed software to test each individual's overall capacity and determine their unique heatmap of their visual field.

Two significant applications:

- **Split Second Analytics - Identifying blind spots and sweet spots in people's field of vision**
- **Real-Time Assessment – Assessing an individual's readiness to do their job**

Markets and applications:

- **Athletics**
- **Military**
- **Police**
- **Security**
- **Transportation**



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Command Centers, HUD and Displays:

- More information can be loaded where that person has a higher bandwidth, less information where there is less bandwidth.
- Ensures optimal situational awareness of the operator.
- We can identify locations where a given individual will tend to miss something versus always see it.

Training and process to be tailored to each individual and teams:

- Modification to their behavior to compensate for their weaknesses and exploit their strengths.
- Assist in identifying the right individual for the task, organize teams based on strengths

Baseline cognitive assessment for security and safety:

- Quickly detect the reduction in cognitive capacity associated with cognitive impairment (stress, sleep deprivation, alcohol and narcotics, nerves)