The Straddle (Buffy) Effect in temporal contrast processing (adaptation) is spatially very local

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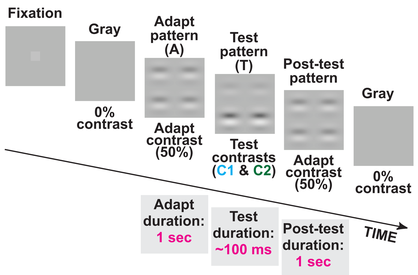
» The Straddle Effect «

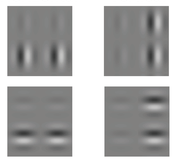
The Test pattern is <u>difficult</u> to perceive correctly when its contrasts STRADDLE the Adapt contrast.
The Test pattern is <u>easy</u> to perceive correctly when both its contrasts are ABOVE or both are BELOW the Adapt contrast.

» THE BASIC PSYCHOPHYSICAL TRIAL «



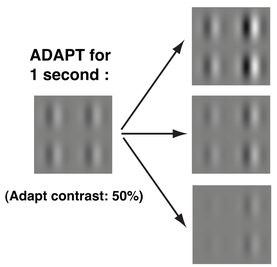
OBSERVER'S TASK:
Identify global (2nd order) orientation

Correct Response:
"Horizontal" "Vertical"



- Feedback as to the correctness of the response always given.
- Each Gabor patch was ~1 deg at the viewing distance of 0.9 m.

» Results subset «



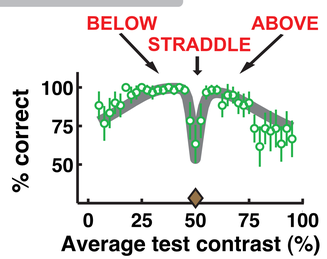
% CORRECT on TEST from 3 observers

99%, 86%, 88%
ABOVE the Adapt contrast
(Test contrasts: 60%, 70%)

57%, 61%, 53%
STRADDLE the Adapt contrast
(Test contrasts: 45%, 55%)

99%, 96%, 91%
BELOW the Adapt contrast
(Test contrasts: 30%, 40%)

» Butterfly curve «

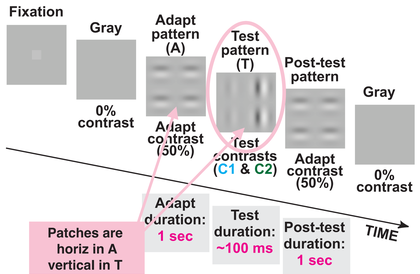


Data ± 2 SE
Predictions from model
Adapt contrast = 50%
Test contrast difference = IC1-C2I = 10%
Observer: SYP

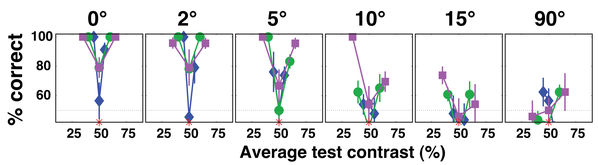
» Orientation «

» What if orientation of A and T patches differ?

A and T differ in Gabor orientation
e.g. Gabors in A perp. to those in T

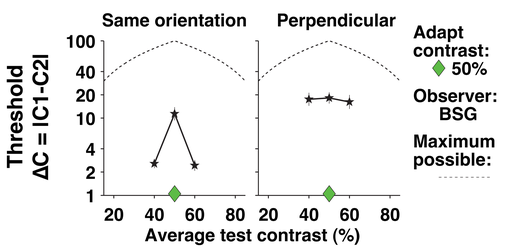


Orientation difference between A and T patches varies from 0° to 90°



Adapt contrast = 50%
Test contrast difference = IC1-C2I = 10%
Test contrast difference = IC1-C2I = 20%
Test contrast difference = IC1-C2I = 30%

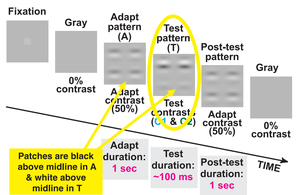
A and T patches same orientation or perpendicular



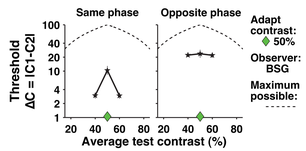
» Phase & Position «

» What if phase flips (A and T phases differ by 180 deg)?

A and T patches differ in phase by 180 deg

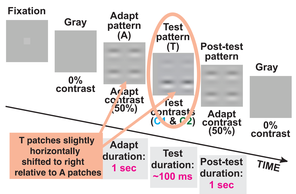


A and T patches either same phase or opposite (180 deg)

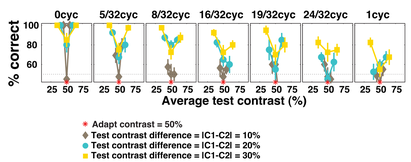


» What if T patches horizontally shifted from A patches?

A and T patches horizontally shifted

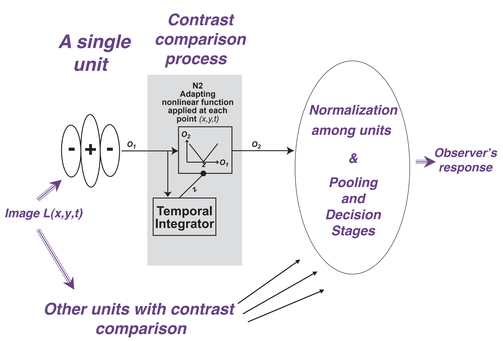


Horizontal shift between A and T patches varies from 0 to 1 cycles



Adapt contrast = 50%
Test contrast difference = IC1-C2I = 10%
Test contrast difference = IC1-C2I = 20%
Test contrast difference = IC1-C2I = 30%

» Discussion «



When the spatial characteristics of A and T patterns are identical, there is always a straddle effect.

When the spatial characteristics of A and T patterns differ more than a small amount, the straddle effect becomes less dramatic and can disappear.

The way it disappears is NOT that the Straddle Test pattern becomes easier to see correctly. Instead the patterns just Above and just Below the straddle range become much harder to see correctly.

It is as if the visual system encodes the *magnitude* of the change but NOT the *sign* of the change. Why?

Is the Straddle Effect a side effect of the visual system having evolved to detect quick changes (i.e., transients)?