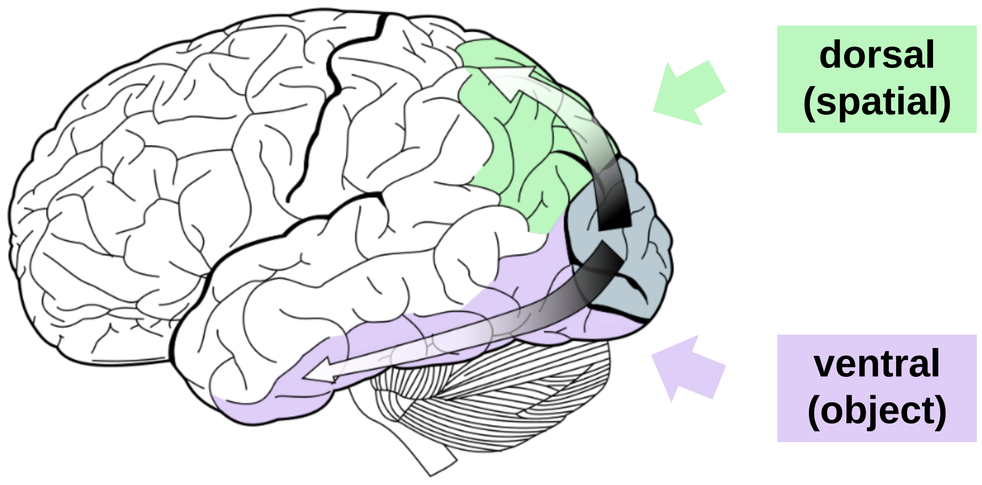
Can we report how we perceive? Limited evidence for assessing low-level visual processing via first-person report

Download Poster

Background

According to one of the most influential models of visual processing, two distinct pathways originate from the primary visual cortex: the **ventral visual pathway** and the **dorsal visual pathway**.



The **ventral** visual pathway is related to processing information associated with **object recognition**. By contrast, the **dorsal** visual pathway is related to processing information associated with **spatial information**.

Despite the seminal impact of the two-pathways model, empirical evidence for individual differences in low-level visual processing preferences (i.e., ventral vs. dorsal) is scarce.

Hence, the **goal** of the present research was the creation of a **reliable and valid questionnaire** assessing individual differences in ventral vs. dorsal visual processing.

Methods

Participants: *N* = 393 from the general population

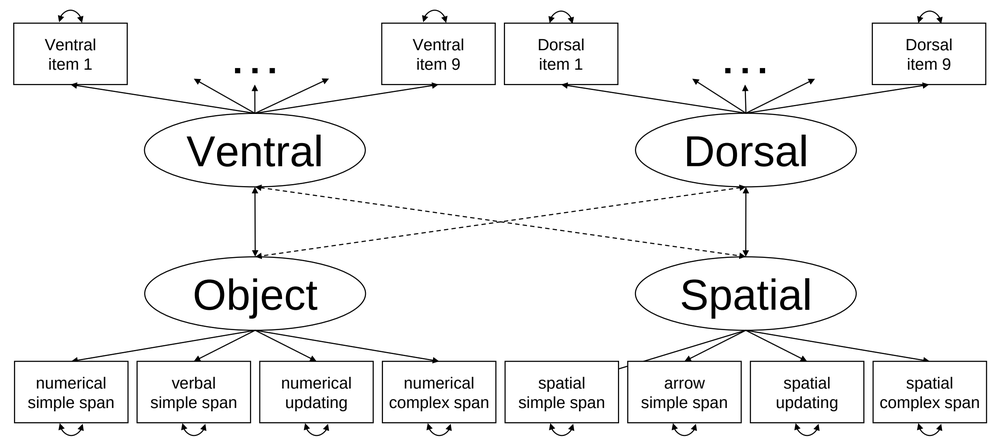
Experimental tasks:

- 4 short-term memory tasks: 2 object (ventral) and 2 spatial (dorsal)
- 4 working-memory tasks: 2 object (ventral) and 2 spatial (dorsal)

Questionnaire: Adaptation of ventral-dorsal questionnaire (cf. Borst et al., 2011; Kosslyn & Thompson, 2012)

- 9 items related to the processing of the ventral visual pathway [color, objects, high-spatial frequency]
- 9 items related to the processing of the dorsal pathway [achromatic, motion, low-spatial frequency]

Analysis plan



Results

- Removed 4 items to maximise Cronbach alpha = .60 (min = .54; max .65, *N* = 14 items)
- Two-factor solution (Varimax rotation)
- Total variance = .18, RMSEA = .072, CI_{90} [.061, .084]

Path	F1	F2	Item
ve	0.61	0.09	When I look into a forest, I pay attention to the smallest … individual leaves.
do	-0.47	-0.23	I am not interested in colors.
do	0.43	0.20	Even the slightest movements in the environment attract my attention.
ve	0.34	0.19	I can perceive the smallest differences in color
ve	0.32	0.00	I prefer to deal with details instead of large contexts.
do	-0.03	0.68	I immediately recognize a person I know by his or her movements.
ve	0.09	-0.65	I cannot distinguish familiar people by their movements.
ve	0.31	0.36	I recognize a person by subtle features in his or her face.
do	-0.30	-0.06	When I look at a painting or a sculpture, I take it in as a whole...
do	0.26	0.14	I like to look at passing landscapes out of the window when I am on a train…
ve	0.19	0.02	I like finely patterned colored dresses better than classic black dresses.
ve	0.18	-0.03	I prefer to look at photos and pictures instead of movies.
do	0.16	-0.01	I prefer black and white photographs/films to color photographs/films.
ve	-0.08	-0.18	I am not good at detecting differences in brightness.

Note. F1 = color and high-spatial frequency; F2 = motion**;** do = dorsal; ve = ventral

Conclusion

The current version of the visual ventral-dorsal questionnaire has low internal consistency and does not result in a reliable factor structure. Therefore, it could not be validated with the experimental tasks.

While higher level visual phenomena (e.g., visual mental imagery, synesthesia, etc.) can be readily and reliably assessed by self-report measures, the current results suggest that it might be more **difficult to assess low-level visual processing preferences with questionnaires** – although not entirely impossible.

References

Borst, G., Thompson, W. L., & Kosslyn, S. M. (2011). Understanding the dorsal and ventral systems of the human cerebral cortex: Beyond dichotomies. *American Psychologist*, *66*(7), 624–632. https://doi.org/10.1037/a0024038

Kosslyn, S. M., & Thompson, W. L. (2012). Assessing habitual use of dorsal versus ventral brain processes: The dorsal–ventral questionnaire. *Biologically Inspired Cognitive Architectures*, *2*, 68–76. https://doi.org/10.1016/j.bica.2012.07.007

Alodie Rey-Mermet, Rebecca Ovalle-Fresa, Thomas P. Reber, & Nicolas Rothen

Faculty of Psychology, UniDistance Suisse, Brig, Switzerland

Contact: nicolas.rothen@fernuni.ch

Follow us

FernUni.ch
UniDistance.ch

Universitäres Institut akkreditiert nach HFKG
Institut universitaire accrédité selon la LEHE