





# qualpal: qualitative color palettes for everyone

Johan Larsson <sup>1</sup>

<sup>1</sup> Department of Mathematical Sciences, University of Copenhagen 

DOI: [10.xxxxxx/draft](https://doi.org/10.xxxxxx/draft)

## Software

- [Review](#) 
- [Repository](#) 
- [Archive](#) 

Editor: [Open Journals](#) 

## Reviewers:

- [@openjournals](#)

Submitted: 01 January 1970

Published: unpublished

## License

Authors of papers retain copyright  
and release the work under a  
Creative Commons Attribution 4.0  
International License ([CC BY 4.0](#)).

## Summary

qualpal is a C++ library for generating qualitative color palettes with maximum perceptual distinctiveness, designed for scientific data visualization and accessibility. It supports flexible palette generation via multiple input formats (RGB, HSL and LCHab (HCL) colorspaces, built-in palettes) and can adapt palettes to color vision deficiencies (CVD) of the full dichromacy spectrum (protanopia, deuteranopia, tritanopia) with any choice of severity. The library is also available as a [R package](#) and as a web application at [qualpal.cc](https://qualpal.cc), providing easy-to-use interfaces for generating color palettes in R and directly in the browser.

## Statement of need

Effective visualization of categorical data requires color palettes with easily distinguishable colors, both for people with normal color vision and those with color vision deficiencies (CVD). qualpal addresses this problem by providing an automatic method for generating and extending color palettes, supporting a range of inputs and granular control over adaptability to CVD. It is useful for researchers, data scientists, and developers in need of high-quality, accessible color palettes for figures, charts, and interfaces.

To support the large community of R users in scientific visualization, qualpalr provides bindings to the C++ library, allowing palette generation directly from R and integration with R plotting packages.

## Acknowledgements

[Bruce Lindbloom's webpage](#) has been a great resource for developing the color classes in qualpal, and incredibly helpful in debugging color conversions and ensuring that the color spaces are implemented correctly.

## References