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Introduction

- **Brain-based visual prosthetics (BBVPs)** aim to restore sight or a functional analogue for people with acquired blindness.
- **Have received little attention from neuroethicists** compared to other invasive neuromodulation.
- Raise complex questions about **non-clinical risks and benefits, access, and how to conceptualize and measure research success.**

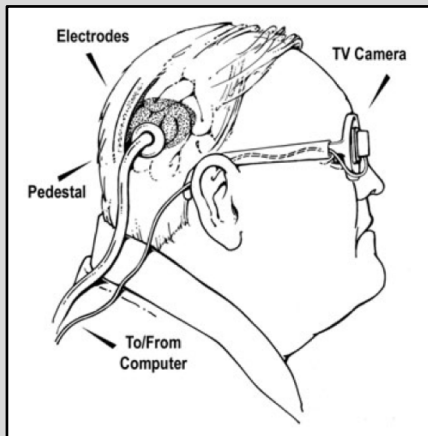


Figure 1. Sketch of the Dobbelle Eye published in [1].

History of BBVPs

- First prototype BBVP electrode array implanted in **1968**.
- Advanced considerably by **William Dobbelle** from 1970s to early 2000s, with limited parallel NIH work occurring in the 1990s.
- Dobbelle's work ended with his abrupt death in 2004.
- Several groups are now working to develop similar systems.



Ethical Problems in Dobbelle's Work

- To skirt FDA regulations, Dobbelle arranged for participants to undergo surgery in Portugal [2].
- One participant suffered a seizure after being allowed to control the stimulation of their own brain [2].
- Interviews with 13 of Dobbelle's former research participants [3] identified issues related to:
 - informed consent
 - therapeutic misconception
 - unmet expectations
 - financial burdens
 - post-trial access

Learning from Past Mistakes

- Contemporary work on BBVPs must avoid similar ethical missteps.

ISSUES TO CONSIDER IN CONTEMPORARY BBVP RESEARCH

Consent Issues

- Motivations to participate
- Decision-making process
- Risk-benefit perceptions
- Unrealistic or heterogenous expectations
- Therapeutic misconception

Non-Clinical Risks and Benefits

- Quality of life
- Psychological effects
- Identity, discrimination, and stigma
- Privacy and security

Policy Issues

- Cost, access, & post-trial obligations
- Free will, autonomy, & responsibility
- Public acceptance
- Dual use

Conceptual Issues

- Nature of success
- Disability vs. difference

Future Directions

- Conduct ethnographic observation of researchers to determine conceptions and measures of success in the research enterprise.**
- Conduct semi-structured interviews with researchers and current research participants to understand key perspectives.**

References

1. Clark A. 2003. Natural-born cyborgs: Minds, technologies, and the future of human intelligence. Oxford University Press.
2. Kotler S. Vision Quest. *Wired Magazine*. September 1, 2002. <https://www.wired.com/2002/09/vision/>.
3. Lane FJ, Nitsch KB, Troyk P. 2015. Participant perspectives from a cortical vision implant study: Ethical and psychological implications. *7th International IEEE/EMBS Conference on Neural Engineering*; 264-267.

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