



---

# The Bronze Key: Performing and Materializing a Cipher System

**Susan Kozel**

Malmö University  
205 06 Malmö, Sweden  
susan.kozel@mau.se

**Ruth Gibson**

Gibson/Martelli & Coventry University  
Coventry, UK  
ruth@gibsonmartelli.com

**Bruno Martelli**

Gibson/Martelli  
London, UK  
bruno@gibsonmartelli.com

## ABSTRACT

*The Bronze Key* is an art installation where data traces of bodily movement captured in 3D by digital systems are re-materialized into audio, bronze and print. The 3 objects of *The Bronze Key* represent the performance of the first 3 steps of the basic symmetrical cipher system: The Plaintext, The Key and The Ciphertext(or Cryptogram). This project is an embodied and performative intervention in discourses and practices around data privacy and strategies for data obfuscation. It is the result of a collaborative and experimental design process involving dance, motion capture, 3D visualisations and VR.

---

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the owner/author(s).

MOCO 2018, The 5<sup>th</sup> International Conference on Movement and Computing, June 2018, Genoa, Italy

© 2018 ACM This is the author's version of the work. It is posted here for your personal use. Not for redistribution. The definitive Version of Record was published in ...

[Hips]				
1	-4834.899982	951.2000122	6003	-1.341766
2	-4834.582275	951.2000122	6002	58252
3	-4834.399982	951.2333984	6002	263184
4	-4834.399982	951.3062134	6001	943848
5	-4834.399982	951.2999878	6001	729804
6	-4834.405762	951.1943359	6001	599609
7	-4834.299885	951.2999878	6001	599609
8	-4834.187988	951.2062988	6001	5
9	-4834.070313	951.2999878	6001	400391
10	-4833.950195	951.2999878	6001	350098
11	-4833.82959	951.2999878	6001	196289
12	-4833.69873	951.2999878	6001	105469
13	-4833.800049	951.2999878	6000	900391
14	-4833.905029	951.2999878	6000	693848
15	-4833.996338	951.4074097	6000	603516

Fig 1 The Plaintext mocap data



Fig 2. The Key capture



Fig 3. Cast for bronze version of Key

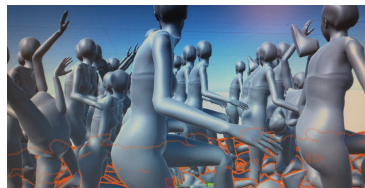


Fig 4. The Ciphertext in Unity

## CCS CONCEPTS

• **Human Centred Computing** → **Interaction Design**; *Interaction Design Theory Concepts and Paradigms*; → **Interaction Paradigms**; *Virtual Reality* • **Security and Privacy** → **Cryptography**  
Symmetric Cryptography and Hash Functions

## KEYWORDS

Materiality, Motion Capture, Virtual Reality, Encryption, Performativity, Embodied Interaction

## 1 PERFORMING ENCRYPTION

The alternative to leaving data open and unprotected is to cultivate practices of obfuscation, including encryption [1-3]. An encryption process is made up of a set of actions that render confidential communication unintelligible, or intelligible only to those with whom we desire to communicate [4]. A basic symmetrical cipher system has the following steps: A Plaintext (readable message) is encrypted by means of an encryption algorithm (also called a Key) into incomprehensible Ciphertext, it is then decrypted by the designated recipient using the same key to reveal the original message. This is a temporal process.

The Bronze Key installation consists of: 1) The Plaintext: a 30 second movement sequence captured using the Perception Neuron motion capture system, materialized as numerical data recorded as text-to-speech and played on magnetic audio tape (Reel-to-Reel) (Fig.1); 2) The Key: an arm and hand gesture lasting 1 second captured using Oculus Rift's Quill, 3D printed and cast in bronze (Figs. 2 & 3); 3) The Ciphertext: a version of the original movement data encrypted using the Key, visualized in Unity (Fig. 4), printed as a book (73,000 lines of data on 668 pages).

Obfuscation of data occurred as a series of re-materializations: from body, to digital data, to analogue materials. This performative approach to encryption has the goals of re-configuring the body's relation to data and fostering of controversies around protection of bodily data traces [5].

## REFERENCES

- [1] Finn Brunton and Helen Nissenbaum. 2016. *Obfuscation: A User's Guide for Privacy and Protest*, The MIT Press, Cambridge, Mass and London.
- [2] Susan Kozel. 2017. Performing Encryption. In *Performing the Digital*, M. Lecker, I. Shipper and T. Beyes (eds.) Transcript Verlag, Bielefeld, 117-134.
- [3] Susan Kozel, Ruth Gibson and Bruno Martelli. Forthcoming 2018. The Bronze Key: Performing Data Encryption. TEI '18, March 18–21, 2018, Stockholm, Sweden. ACM <https://doi.org/10.1145/3173225.3173306>
- [4] Fred Piper and Sean Murphy. 2002. *Cryptography: A Very Short Introduction*. Oxford University Press, Oxford, UK..
- [5] Rocco Bellanova. 2014. Data Protection, with Love. *International Political Sociology* 8 (1): 112-115. DOI: 10.1111/ips.12045.