

# A mnemonic card game for your Amino Acids

Georges Hattab<sup>1,2</sup> Benedikt G. Brink<sup>1,2</sup> Tim W. Nattkemper<sup>2</sup>

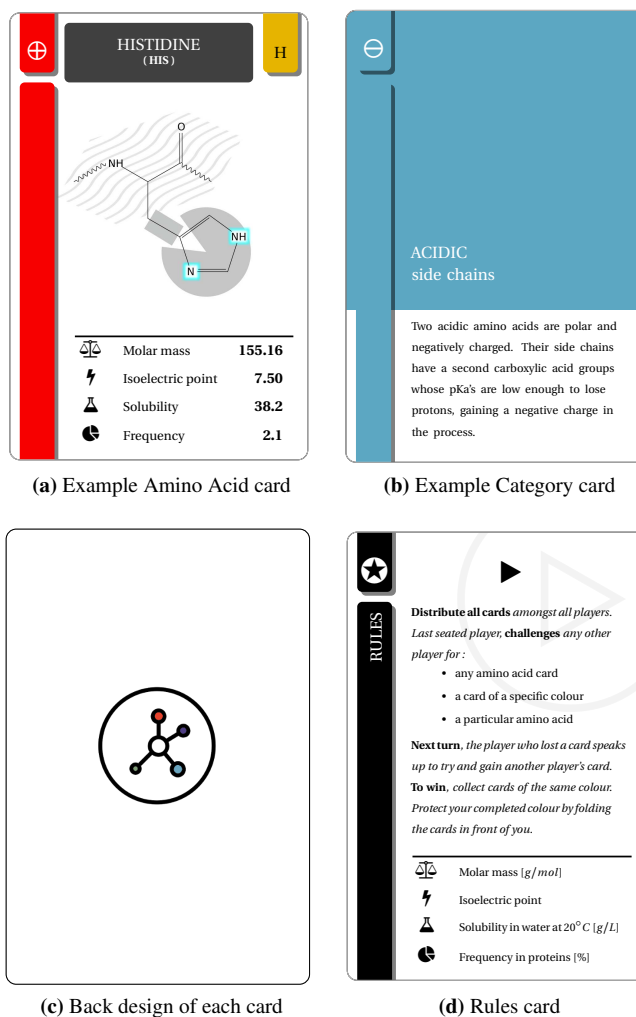
<sup>1</sup>Bielefeld University, Faculty of Technology, Int. Research Training Group 1906, Computational Methods for the Analysis of the Diversity and Dynamics of Genomes (DiDy)

<sup>2</sup> Bielefeld University, Faculty of Technology, Biodata Mining Group. Bielefeld, Germany

## ABSTRACT

Since the 1980s the progression in Natural Sciences challenged the educational institutions and media to keep the society on an appropriate level of knowledge and understanding. Two very prominent early developments were PUS(H): Public Understanding of Sciences (and Humanities) (Budmer 1985) and PEST: Public Engagement of Science and Technology (Wyne 2001). One very prominent and diverse area is molecular Biology/Biochemistry with its huge collection of Biomolecules. Although the feature representations are standardised to some extent depending on the used structural formula (e. g. skeletal formula, unspecified stereochemistry, Fischer projection, etc) learning to navigate in this knowledge domain takes years. In this project, we investigate the potential of infographics, graphical design and game motivation for learning the features of a special group of biomolecules, the amino acids. We propose a mnemonic card game based on creative design to aid memory retain the biochemical amino acids. Each amino acid is composed of a number of features, which are often shared among more than one amino acid. We developed an intuitive system to code these features into shapes, colours and textures, so to assist our abilities in interpreting visual stimuli, recognising such features, grouping them, noting relationships, and ultimately memorising the structural formulas (Bitterman 1965). This provides students with the possibility of using the cards for a card game to learn the amino acid properties and formulas, respectively by simply having fun and challenging each others. This approach could serve as a teaching tool for subject-oriented card game designs so to retain relevant information by using perceptual memory and fun. This work establishes a connection in such a way that design is at the service of the public.

**Index Terms**— playing cards, education, amino acids, infographics, PUS.



**Fig. 1:** Example playing cards included in the cards game. (a) showcases the Histidine (H) amino acid with its respective formula, the category colour and symbol (left and top left of card) which is in this case the basic category (or positively charged). The lower part of the card presents three numerical values. The molar mass ( $g/mol$ ), the Isoelectric point or pI, the solubility at 20 deg. C ( $g/L$ ) and the Frequency in Vertebrates (%) are represented as the symbol of a scale, lightning bolt, a flask (or erlenmeyer), and a pie chart, respectively. (b) is a category card, it explicates the amino acids properties pertaining to this category. (c) depicts the back design of each card. Adapted logo courtesy of E. Harrison (CC). (d) lists briefly the important rules.

<sup>1</sup> ghattab@cebitec.uni-bielefeld.de