ANGELIKI ANDRIKOPOULOU[1], ATHANASSIOS PROTOPAPAS[1,2] & AMALIA ARVANITI[3]

[1]*Department of Philosophy and History of Science, University of Athens*

[2]*University of Oslo, Norway*

[3]*Department of English Language and Linguistics, University of Kent, UK*

Lexical stress is not underspecified: evidence for the representation of stress from eye-tracking

Is stress inseparably connected to the lexical representations in the lexicon or is it underspecified and assigned upon words through metrical frames? In the current study we investigated the representation of stress in Greek with two visual-world experiments. We aimed to: (a) replicate previous findings in Italian and German, (b) add details on the nature of stress representation in the lexicon based on the theories of underspecification and metrical patterns, and (c) investigate the influence of the stress mark in the process of word processing in silent reading. 72 adults, native speakers of Greek, participated in Experiment 1. To test theories of stress representation, 30 critical pairs of three-syllable words were selected. Each pair was matched segmentally on their first two syllables and the first phoneme of their third syllable but differed in stress. The 30 pairs were divided into three groups of alternative stress patterns. In particular, 10 pairs had stress on their first and second syllable, 10 pairs had stress on their second and third syllable, and 10 pairs had stress on their first and third syllable. During the experimental procedure, participants listened to semantically neutral sentences ending with the target word and had to mouse-click on the target, selecting in every trial among four alternative lexical candidates presented on a computer screen. If stress is underspecified, we expected asymmetrical competition effects among competitive pairs. More specifically, when the target words were stressed with less frequent stress patterns (i.e. antepenultimate or final, presumably marked), and their competitors were stressed with the dominant stress pattern (i.e., penultimate, presumably unmarked), then we expected higher levels of competition, reflected in smaller differences between fixations in the two words. In contrast, when target words had the dominant, unspecified stress pattern and their competitors had one of the two fully specified stress patterns (i.e., antepenultimate or final), then we expected smaller competition effects, reflected by greater difference in fixations to the two words. Experiment 2 was a replication of Experiment 1, in which all stress diacritics were eliminated from the displayed words. Forty-two native speakers of Greek took part in this experiment. The results of Experiment 1 replicated previous findings supporting the view that lexical stress affects word recognition at early stages, with significantly more fixations recorded for targets before segmental disambiguation. The results of Experiment 2 replicated to some extent those of Experiment 1, suggesting that the stress diacritic in written words may have some impact on word recognition processes. Crucially, there was no evidence in favor of underspecification in either experiment, as the predicted asymmetries in the competition between targets and competitors with alternative stress patterns were not confirmed.

ΣΟΦΙΑ ΛΟΥΗ[1] & ΑΘΑΝΑΣΙΟΣ ΠΡΩΤΟΠΑΠΑΣ[2]

[1]Τμήμα Ιστορίας και Φιλοσοφίας της Επιστήμης, Πανεπιστήμιο Αθηνών

[2]University of Oslo, Norway

Πρώιμη Μορφολογική κατάτμηση κατά την οπτική λεξική αναγνώριση: αλήθεια ή μύθος;

Κεντρικά ερωτήματα πολλών μελετών στον τομέα της λεξικής επεξεργασίας είναι α) πώς επεξεργαζόμαστε τις σύνθετες μορφολογικά λέξεις (π.χ. player, playing): ως ενιαίες λέξεις (player, playing) ή με βάση τα συστατικά τους μορφήματα (play-er, play-ing) και β) πότε εξασφαλίζεται πρόσβαση στην μορφολογική πληροφορία κατά την οπτική λεξική αναγνώριση. Κι ενώ οι ενδείξεις συγκλίνουν υπέρ της επεξεργασίας των λέξεων βάσει των συστατικών τους μορφημάτων, υπάρχει έντονη ασυμφωνία σχετικά με το χρονικό πλαίσιο κατάτμησης της λέξης σε μορφήματα: λαμβάνει χώρα πρώιμα κατά την λεξική αναγνώριση βασιζόμενη αποκλειστικά στην ανάλυση της ορθογραφίας των λέξεων ή λαμβάνει χώρα αργότερα κατά την αναγνώριση και καθορίζεται από τα σημασιολογικά χαρακτηριστικά της λέξης; Η παρούσα μελέτη διερευνά τον ιδιαίτερο ρόλο της ορθογραφίας και της σημασίας στη λεξική αναγνώριση της ελληνικής γλώσσας σε έργα οπτικής λεξικής απόφασης με συγκαλυμμένη (Πείραμα 1) και καθυστερημένη (Πείραμα 2) προέγερση, όπου αντανακλώνται πρώιμα ή ύστερα στάδια της λεξικής αναγνώρισης αντίστοιχα. Πιο συγκεκριμένα, μελετάται η επίδραση της ορθογραφικής (π.χ. ορμόνη-ορμές) και σημασιολογικής (π.χ. εντάσεις-ορμές) προέγερσης σε σύνθετες μορφολογικά λέξεις, που συνιστούν το σύνολο των λέξεων της ελληνικής γλώσσας, κι εν συνεχεία συγκρίνονται με την επίδραση της μορφολογικής προέγερσης στις ίδιες σύνθετες μορφολογικά λέξεις (π.χ. ορμής-ορμές), όπου η κοινή ορθογραφία και σημασία συνυπάρχουν. Τα αποτελέσματα των παραπάνω πειραμάτων συμφωνούν ότι στην λεξική αναγνώριση των ελληνικών λέξεων, ο ρόλος της μορφολογίας είναι σημαντικός κι ανεξάρτητος από το ρόλο της ορθογραφίας και της σημασίας, καθώς απουσία μορφολογικής σχέσης, η επίδραση της ορθογραφικής ομοιότητας δεν ήταν σημαντική στο έργο με συγκαλυμμένη προέγερση, ούτε η επίδραση της σημασιολογικής ομοιότητας στο έργο καθυστερημένης προέγερσης. Τα αποτελέσματα θα συζητηθούν με άξονα τις θεωρίες λεξικής αναγνώρισης.

PETROS A. M. GELEPITHIS

Faculty of Medicine, University of Crete

Affect in Humans, Nonhuman Animals, and Robots

I will use the term ‘affect’ as an umbrella term to include the notions of‘emotion’, ‘feeling’, ‘mood’, etc as used in studies both across species and about emotional-to-become robots. This paper focuses on emotions.

Emotions are ancestral in their origin and they are present in probably most animal taxa. It has been argued that all mammalian species have emotions (Ranksepp 1998) and many subsequent studies (e.g., Ranksepp & Lahvis 2011; Reimerta et al.2013) support this view. Although this sweeping statement may not be correct (e.g., Edgar et al. 2012), there is evidence of emotions in birds (e.g., Bekoff 2007; Orlaith & Bugnyar 2010), fish (Rey et al., 2015) and insects (e.g., Bateson et al. 2011). In addition, there are studies pointing out the existence of higher order emotions in dogs (e.g., Albourquerque et al. 2016).

In addition, human emotions are ubiquitous across human cultures and play pivotal role in all human activities and decisions (consciously or unconsciously). Their impact range from everyday behaviour to scientific research, from love, sex, and compassion, to blind acts of terror. Is there possibility for this enormous and centrally significant space of human emotions to be further enriched?

Recently, advances in both psychology and artificial intelligence allow machines to recognise and express emotions, enabling new technologies spanning a wide range of fields and sectors from education to commerce and from therapy to security (e.g., Picard 2000; Anderson & Kaliouby 2009; Breazeal 2009; Arkin & Moshkina 2015; Cowalczuk & Czubenko 2016; Jung 2017; Pessoa 2017). Such developments have in turn raised several ethical and social issues concerning the full range of ‘noémon’ systems including humanoid or not robots with designed or, possibly, own emotions (see, for instance, Anderson & Anderson 2011; Bringsjord et al 2012).

This paper is in two parts. In the first, I propose six clusters of issues that any aspiring theory of emotions, and of course of mind, should ideally be able to address satisfactorily. I subsequently suggest that any theory of emotion should be judged in terms of its efficacy to address these six clusters.

In the second part, I introduce the perspective of the *theory of noémon systems* on the nature and mechanisms of emotion of an e-entity[1].

[1]An umbrella term to refer to either a human and a non-human animal capable of emotions, or a robot capable of recognising and exhibiting emotions.

References

Albuquerque, N., Guo, K., Wilkinson, A., Savalli, C., Otta, E. & Mills, D. (2016). Dogs recognize dog and human emotions. *Biology Letters* Vol. 12 No. 1, 20150883.

Anderson, M. & Anderson, S. L. (eds) (2011) *Machine Ethics*. CUP.

Anderson, P., & le Kaliouby, R. (2009). Computation of emotions in man and machines. *Phil. Trans. R. Soc. B* (2009) 364, 3441–3447.

Arkin, R. C., and Moshkina, L. (2015) Affect in Human-Robot Interaction. In *The Oxford Handbook of Affective Computing*. Eds, R. Calvo, S. D'Mello, J. Gratch, and A. Kappas, OUP.

Bateson, M., Desire, S., Gartside, S.E., & Wright, G.A. (2011). Agitated honeybees exhibit pessimistic cognitive biases. *Current Biology*, 21 (12): 1070–1073.

Bekoff, M. (2007). *The Emotional Lives of Animals*. Novato, California: New World Library.

Breazeal, C. (2009). The role of expressive behaviour for robots that learn from people. *Phil. Trans. R. Soc. B* (2009) 364, 3527–3538.

Bringsjord, S., and Taylor, J. (2012) The Divine-Command Approach to Robot Ethics. In *Robot Ethics: The Ethical and Social Implications of Robotics*, P. Lin, L. Abney, and G. A. Bekey, (eds). The MIT Press.

Cowalczuk, Z, and Czubenko, M. (2016) Computational Approaches to Modeling Emotion – An Overview of the Proposed Solutions. *Frontiers in Robotics and AI*. Vol. 3, No. 21, pp. 1-12.

Edgar, J.L., Paul, E.S., Harris, L., Penturn, S., & Nicol, C.J. (2012). No Evidence for Emotional Empathy in Chickens Observing Familiar Adult Conspecifics. *PLoS ONE*, Vol. 7., No. 2, e31542.

Jung, M. F. (2017) Affective Grounding in Human-Robot Interaction. *HRI '17*, March 06-09, 2017, Vienna, Austria.

Orlaith, N.F., & Bugnyar, T. (2010). Do Ravens Show Consolation? Responses to Distressed Others. *PLoS ONE,* 5 (5): e10605.

Panksepp, J. (1998). *Affective Neuroscience: The Foundation of Human and Animal Emotions*. Oxford University Press, New York.

Panksepp, J.B., & Lahvis, G.P. (2011). Rodent empathy and affective neuroscience. *Neuroscience and Biobehavioral Reviews*, 35 (9): 1864–1875.

Pessoa, L. (2017). Do Intelligent Robots Need Emotion? *Trends in Cognitive Sciences*, Vol. 21, No. 11, pp. 817-819.

Picard, R. (2000) *Affective Computing*. MIT Press.

Reimerta, I., Bolhuis, J.E., Kemp, B., & Rodenburg, T.B. (2013). Indicators of positive and negative emotions and emotional contagion in pigs. *Physiology and Behavior* 109: 42–50.

Rey, S., Huntingford F. A., Bolta•a, S., Vargas R, Knowles T. G., Mackenzie S. 2015 Fish can show emotional fever: stress-induced hyperthermia in zebrafish. *Proc. R. Soc. B* 282: 20152266.