Language that conveys emotion: a commentary on Hinojosa, Moreno and Ferré (2019)

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Over the last 20 years, research on the effects of emotion on language processing has flourished. Converging evidence from behavioural and neurophysiological studies has shown that the emotive content of verbal materials affects language processing in systematic ways. In particular, emotionally-laden words, similarly to pictures and faces, capture attention at early processing stages, are given processing priority over emotionally neutral words, and elicit enhanced and sustained electrophysiological activation compared to neutral words (e.g., Citron, 2012; Kissler, Herbert, Peyk, & Junghofer, 2007; Kousta, Vinson, & Vigliocco, 2009). These findings show that certain evolutionary ancient parts of our brain, dedicated to the detection of threats as well as food and sexual partners, are additionally recruited in response to abstract and symbolic stimuli, namely written and spoken words (Anderson, 2010; Hamann & Mao, 2002; Ponz et al., 2013), even when presented in isolation. These findings challenged traditional models of word recognition (Coltheart, Rastle, Perry, Langdon, & Ziegler, 2001; Jacobs & Grainger, 1994; Norris, 2013; Plaut, McClelland, Seidenberg, & Patterson, 1996), which had emphasised effects of a range psycholinguistic variables including word length, neighbourhood size, frequency, familiarity, age of acquisition, and imageability, among others, but not considered potential effects of affective variables such as emotional valence and arousal.

Pioneering work on the electrophysiological correlates of emotion word processing was thoroughly reviewed by Kissler, Assadollahi and Herbert (2006), and the subsequent fast growth of electrophysiological and neuroimaging studies in the field was reviewed and critically evaluated by Citron (2012). Hinojosa, Moreno and Ferré (2019) now update and expand those reviews by including research beyond the single word level to investigate effects of emotive content on grammatical and semantic processes at the sentence and discourse levels. Their extensive critical review therefore represents an invaluable source of information for scholars interested in the interplay between emotion and language. They also highlight a number of limitations to our current knowledge on how emotion affects language processing and propose future directions for research on affective neurolinguistics.

Current debates have focused on how the emotion and the language neural networks affect one another (Herbert, 2019), whether the two dimensions of emotion – valence and arousal – are to be considered lexical or semantic properties (Citron, 2012), whether the processing of one dimension precedes and informs the processing of the other (Gianotti et al., 2008; Recio, Conrad, Hansen, & Jacobs, 2014), and whether the effects of emotion on combinatorial and semantic processes are unique to the affective properties of words or are equally elicited by other

psycholinguistic properties (Molinaro, 2019). While this and other work in affective neurolinguistics has focused on literal language, I would like to draw attention to a different aspect of the relationship between emotion and language; namely, that certain language we use may be especially suited to convey our emotional states and feelings. This is the case of figurative language which includes metaphors, *She has a bubbly personality*, idioms, *He's over the moon*, and irony, among others.

Initial pioneering work by Ortony and Fainsilber (1987) showed that people tend to use more metaphors in the description of autobiographical memories when they were asked to explain *how they felt* compared to *what happened*, and that more metaphors were used in the description of more intense feelings (Fainsilber & Ortony, 1987). See also Drew and Holt (1988, 1998) for related research on the use of idioms. Yet until recently, apart from this initial work, the empirical investigation of figurative language processing and its neural underpinnings, like work on language processing more generally, had largely been conducted without considering emotive content (for meta-analyses, see Bohrn, Altmann, & Jacobs, 2012; Rapp, Mutschler, & Erb, 2012; Yang, 2014).

Recent neurophysiological research has shown that figurative language evokes stronger emotional responses in readers than literal language (Bohrn et al., 2012; Citron & Goldberg, 2014; Forgács et al., 2012; Rojo, Ramos, & Valenzuela, 2014). That is, a meta-analysis of 23 neuroimaging studies of figurative language processing and experimental studies have shown significantly enhanced activation of the left amygdala in response to figurative compared to literal language, among other regions of the emotion as well as extended-language networks (Bohrn et al., 2012; Citron, Cacciari, Funcke, Hsu, & Jacobs, 2019a; Citron & Goldberg, 2014; Citron, Güsten, Michaelis, & Goldberg, 2016a; Citron, Michaelis, & Goldberg, 2019b; Forgács et al., 2012). Amygdala activation is typically associated with the automatic and fast processing of evolutionarily relevant stimuli (Cunningham & Brosch, 2012; Lindquist, Wager, Kober, Bliss-Moreau, & Feldman Barrett, 2012), therefore suggesting that formulating something in a metaphorical or figurative way engages readers more strongly at the emotional level compared to formulating the same or a similar message using literal language.

Given the growth of research on emotion and language, ratings of affective variables have been included in recent databases of figurative as well as literal linguistic materials alongside more traditional psycholinguistic variables (Citron et al., 2016b; Citron, Lee, & Michaelis, 2019c; Montefinese, Ambrosini, Fairfield, & Mammarella, 2013; Schmidtke, Schröder, Jacobs, & Conrad,

2014). Such databases reveal that metaphorical sentences and stories tend to be rated as more emotionally intense than their literal counterparts (with very similar meaning; Citron et al., 2019c). When such stimuli are used, stronger emotive neural and physiological responses are to be expected in response to figurative expressions. However, certain studies have specifically selected figurative and literal stimuli that were comparable on explicit judgments of emotional valence or arousal; for instance, *She looked at him sweetly* was not rated as more positive nor more emotionally arousing than *She looked at him kindly* (Citron et al., 2019a; Citron & Goldberg, 2014; Citron et al., 2016a; Citron et al., 2019b; Forgács et al., 2012). Results from these studies nonetheless showed stronger activation of the amygdala when reading familiar metaphorical sentences or stories for comprehension when compared to otherwise comparable literal stimuli. With other factors such as familiarity and imageability also controlled for, these results imply that expressing something figuratively engages the reader more strongly (Citron et al., 2019a; Citron & Goldberg, 2014; Citron et al., 2016a). Thus, the use of common figurative expressions carries a persuasive advantage and is better suited to convey emotive content than literal language. This aspect, together with a recognition that figurative expressions are pervasive in everyday communication (Cameron, 2008; Pollio, Barlow, Fine, & Pollio, 1977) ought to encourage scholars with an interest in language and emotion to include figurative expressions in their investigations in order to gain a more comprehensive and ecologically valid overview of language processing.

References

- Anderson, M. L. (2010). Neural reuse: A fundamental organisational principle of the brain. *Behavioral and Brain Sciences*, 33(245-266). doi:10.1017/S0140525X10000853
- Bohrn, I. C., Altmann, U., & Jacobs, A. M. (2012). Looking at the brains behind figurative language - A quantitative meta-analysis of neuroimaging studies on metaphor, idiom, and irony processing. *Neuropsychologia*, 50, 2669-2683. doi:10.1016/j.neuropsychologia.2012.07.021
- Cameron, L. (2008). Metaphor and talk. In R. W. Gibbs (Ed.), *The Cambridge handbook of metaphor and thought* (pp. 197-211). New York: Cambridge University Press.
- Citron, F. M. M. (2012). Neural correlates of written emotion word processing: A review of recent electrophysiological and hemodynamic neuroimaging studies. *Brain and Language*, 122, 211-226. doi:10.1016/j.bandl.2011.12.007
- Citron, F. M. M., Cacciari, C., Funcke, J., Hsu, C.-T., & Jacobs, A. M. (2019a). Idiomatic expressions evoke stronger emotional responses in the brain than literal sentences. *Neuropsychologia*, 131, 233-248. doi:10.1016/j.neuropsychologia.2019.05.020
- Citron, F. M. M., Cacciari, C., Kucharski, M., Beck, L., Conrad, M., & Jacobs, A. M. (2016b). When emotions are expressed figuratively: Psycholinguistic and affective norms of 619 idioms for German (PANIG). *Behavior Research Methods*, 48, 91-111. doi:10.3758/s13428-015-0581-4
- Citron, F. M. M., & Goldberg, A. E. (2014). Metaphorical sentences are more emotionally engaging than their literal counterparts. *Journal of Cognitive Neuroscience*, 26, 2585-2595. doi:10.1162/jocn_a_00654
- Citron, F. M. M., Güsten, J., Michaelis, N., & Goldberg, A. E. (2016a). Conventional metaphors in longer passages evoke affective brain response. *NeuroImage*, 139, 218-230. doi:10.1016/j.neuroimage.2016.06.020
- Citron, F. M. M., Lee, M., & Michaelis, N. (2019c). Affective and psycholinguistic norms for German conceptual metaphors (COMETA). *Behaviour Research Methods*. doi:10.3758/s13428-019-01300-7
- Citron, F. M. M., Michaelis, N., & Goldberg, A. E. (2019b). Metaphorical language processing and amygdala activation in L1 and L2. *Manuscript under review*.
- Coltheart, M., Rastle, K., Perry, C., Langdon, R., & Ziegler, J. C. (2001). DRC: A dual route cascaded model of visual word recognition and reading aloud. *Psychological Review*, 108, 204-256.
- Cunningham, W. A., & Brosch, T. (2012). Motivational salience: Amygdala tuning from traits, needs, values, and goals. *Current Directions in Psychological Science*, 21, 54-59. doi:10.1177/0963721411430832
- Drew, P., & Holt, E. (1988). Complainable matters: The use of idiomatic expressions in making complaints. *Social Problems*, 35, 398-417.

- Drew, P., & Holt, E. (1998). Figures of speech: Figurative expressions and the management of topic transition in conversation. *Language in Society*, 27, 495-522.
- Fainsilber, L., & Ortony, A. (1987). Metaphorical uses of language in the expression of emotions. *Metaphor and symbolic activity*, 2, 239-250.
- Forgács, B., Bohrn, I. C., Baudewig, J., Hofmann, M. J., Csaba, P., & Jacobs, A. M. (2012). Neural correlates of combinatorial semantic processing of literal and figurative noun noun compound words. *NeuroImage*, 63, 1432-1442. doi:10.1016/j.neuroimage.2012.07.029
- Gianotti, M., Faber, P. L., Schuler, M., Pascual-Marqui, R. D., Kochi, K., & Lehmann, D. (2008). First valence, then arousal: The temporal dynamics of brain electric activity evoked by emotional stimuli. *Brain Topography*, 20(143-156). doi:10.1007/s10548-007-0041-2
- Hamann, S., & Mao, H. (2002). Positive and negative emotional verbal stimuli elicit activity in the left amygdala. *NeuroReport*, 13, 15-19.
- Herbert, C. (2019). Where are the emotions in written words and phrases? Commentary on Hinojosa, Moreno and Ferré: affective neurolinguistics: towards a framework for reconciling language and emotion (2019). *Language, Cognition and Neuroscience*. doi:10.1080/23273798.2019.1660798
- Hinojosa, J. A., Moreno, E. M., & Ferré, P. (2019). Affective neurolinguistics: towards a framework for reconciling language and emotion. *Language, Cognition and Neuroscience*. doi:10.1080/23273798.2019.1620957
- Jacobs, A. M., & Grainger, J. (1994). Models of visual word recognition - Sampling the state of the art. *Journal of Experimental Psychology*, 20(6), 1311-1334.
- Kissler, J., Assadollahi, R., & Herbert, C. (2006). Emotional and semantic networks in visual word processing: insights from ERP studies. *Progress in Brain Research*, 156, 147-183. doi:10.1016/S0079-6123(06)56008-X
- Kissler, J., Herbert, C., Peyk, P., & Junghofer, M. (2007). Buzzwords. Early cortical responses to emotional words during reading. *Psychological Science*, 18, 475-480.
- Kousta, S.-T., Vinson, D. P., & Vigliocco, G. (2009). Emotion words, regardless of polarity, have a processing advantage over neutral words. *Cognition*, 112, 473-481. doi:10.1016/j.cognition.2009.06.007
- Lindquist, K. A., Wager, T. D., Kober, H., Bliss-Moreau, E., & Feldman Barrett, L. (2012). The brain basis of emotion: A meta-analytic review. *Behavioral and Brain Sciences*, 35, 121-202. doi:10.1017/S0140525X11000446
- Molinaro, N. (2019). "Words and emotions in sentence context": a commentary on Hinojosa, Moreno and Ferré (2019). *Language, Cognition and Neuroscience*. doi:10.1080/23273798.2019.1647346
- Montefinese, M., Ambrosini, E., Fairfield, B., & Mammarella, N. (2013). The adaptation of the affective norms for English words (ANEW) for Italian. *Behavior Research Methods*, 46, 887-903. doi:10.3758/s13428-013-0405-3

- Norris, D. (2013). Models of visual word recognition. *Trends in Cognitive Sciences*, 17, 517-524. doi:10.1016/j.tics.2013.08.003
- Ortony, A., & Fainsilber, L. (1987). *The role of metaphors in descriptions of emotions*. Paper presented at the 1987 workshop on theoretical issues in natural language processing.
- Plaut, D. C., McClelland, J. L., Seidenberg, M. S., & Patterson, K. (1996). Understanding normal and impaired word reading: Computational principles in quasi-regular domains. *Psychological Review*, 103, 56-115.
- Pollio, H. R., Barlow, J. M., Fine, H. J., & Pollio, M. R. (1977). *Psychology and the poetics of growth: Figurative language in psychology, psychotherapy, and education*.: Erlbaum.
- Ponz, A., Montant, M., Liegeois-Chauvel, C., Silva, C., Braun, M., Jacobs, A. M., & Ziegler, J. C. (2013). Emotion processing in words: a test of the neural re-use hypothesis using surface and intracranial EEG. *Social Cognitive and Affective Neuroscience*, 9, 619-627.
- Rapp, A. M., Mutschler, D. E., & Erb, M. (2012). Where in the brain is nonliteral language? A coordinate-based meta-analysis of functional magnetic resonance imaging studies. *NeuroImage*, 63, 600-610. doi:10.1016/j.neuroimage.2012.06.022
- Recio, G., Conrad, M., Hansen, L. B., & Jacobs, A. M. (2014). On pleasure and thrill: The interplay between arousal and valence during visual word recognition. *Brain and Language*, 134, 34-43. doi:10.1016/j.bandl.2014.03.009
- Rojo, A., Ramos, M., & Valenzuela, J. (2014). The emotional impact of translation: A heart rate study. *Journal of Pragmatics*, 71, 31-44. doi:10.1016/j.pragma.2014.07.006
- Schmidtke, D., Schröder, T., Jacobs, A. M., & Conrad, M. (2014). ANGST: Affective norms for German sentiment terms, derived from the affective norms of English words. *Behavior Research Methods*. doi:10.3758/s13428-013-0426-y
- Yang, J. (2014). The role of the right hemisphere in metaphor comprehension: A meta-analysis of functional magnetic resonance imaging studies. *Human Brain Mapping*, 35, 107-122. doi:10.1002/hbm.22160