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Cognitive Science: Piecing Together the Puzzle

Michele I. Feist,^a  Sarah E. Duffy^b 

^a*Department of English, University of Louisiana at Lafayette*

^b*Department of Humanities, Northumbria University*

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Abstract

Alongside significant gains in our understanding of the human mind, research in Cognitive Science has produced substantial evidence that the details of cognitive processes vary across cultures, contexts, and individuals. In order to arrive at a more nuanced account of the workings of the human mind, in this letter we argue that one challenge for the future of Cognitive Science is the integration of this evidence of variation with findings which can be generalized.

Keywords: Individual variation; cultural variation; integrating findings

As scientists, we aim to provide as general of an account as possible of the phenomena we study. Indeed, the very goal of the Cognitive Science Society is stated in general terms: “understanding the nature of the human mind.”¹ In the pursuit of abstract generalizable theories that explain the human mind, the field of Cognitive Science has made extensive use of laboratory experiments, with the generalizability of the findings supported through the use of statistics. From these methods, much has been learned about the workings of the mind.

Alongside this growth in knowledge, however, we see accumulating evidence that cognitive phenomena may look different across cultures, contexts, and individuals. Cognitive differences have been observed at multiple levels of variation: across cultures (e.g., coding

Correspondence should be sent to Michele I. Feist, Department of English, University of Louisiana at Lafayette, P.O. Box 43719, Lafayette, LA 70504, USA. E-mail: feist@louisiana.edu

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of perception: Majid, Roberts, Cilissen, & Emmorey et al., 2018; spatialization of time: de la Fuente, Santiago, Román, Dumitrache, & Casasanto, 2014; see also Henrich, Heine, & Norenzayan, 2010 for a wider perspective), across languages (e.g., motion language and thinking for speaking: Slobin, 1996; metaphoric connections between space and musical pitch: Dolscheid, Shayan, Majid, & Casasanto, 2013; discrimination of color differences: Roberson, Davies, & Davidoff, 2000), and across individual factors, such as religiosity (related to morality judgments: Li & Cao, 2017a), lifestyle (related to metaphor interpretation: Duffy & Feist, 2014), and handedness (related to valence judgments: Casasanto, 2009), *inter alia*. However, this variation is too often treated as a side note (Prather, Benitez, Kendall Brooks, & Dancy et al., 2022). In order to piece together the puzzle of human cognition, we need to not only embrace this variation, but to integrate it with those findings which can be generalized (Scott-Phillips & Nettle, 2022). In this letter, we provide examples of such phenomena, so as to shine a spotlight on the breadth of variation in human cognition and, thereby, the pressing need to integrate the specific with the general (Gibbs, 2021).

1. Sensory perception

A long-held assumption in Western thought is that senses can be ordered hierarchically from higher to lower: the sense of sight has primacy, followed by audition, touch, taste, and smell. To test the validity of this assumption, Majid et al. (2018) surveyed the encoding of perceptual information across a sample of 20 diverse languages. Contra this assumption of universality, however, the relative codability of perceptual information across the senses was found to differ across the languages sampled, suggesting that the senses are not hierarchically organized in the same way for speakers of every language.

2. Memory

In contrast with sensory information, variation in the ways that different languages encode conceptual information in descriptions of motion events has long been noted (Slobin, 1996, Talmy, 2000). Beyond language, studies have demonstrated that narrative structure (Slobin, 1996), memory for properties of a motion event (Feist & Cifuentes-Férez, 2013), and judged similarity between events (Gennari, Sloman, Malt, & Fitch, 2002) likewise vary across cultural groups. As a case in point, Feist and Cifuentes-Férez (2013) compared memory for manner of motion between English speakers, whose language typically encodes this information, and Spanish speakers, who frequently omit it in descriptions. They found that English speakers performed better than Spanish speakers when asked to remember and later recognize short video clips of motion events, but that adding more clips depicting a variety of manners and, thus, highlighting the dimension of manner, gave Spanish speakers—but not English speakers—a boost. These results suggest that people may pay attention to and later remember different properties of events in line with variation in the likelihood of encoding those properties in linguistic descriptions of events.

3. Time as space

Cross-linguistic research on metaphor has likewise uncovered variation, this time in cross-domain mappings, even in cases where the domains involved are the same. A much-studied case is the widely attested metaphor TIME IS SPACE, in which spatial language is used to talk about the timing of events (cf., Duffy & Feist, in press; Haspelmath, 1997). Layered on top of this frequent mapping, however, analyses of language and co-speech gesture reveal that, across cultures, the future may be spatialized in a multitude of ways, with speakers subconsciously placing it “in front” (English), “behind” (Aymara), “below” (Mandarin), and “uphill” (Tzeltal, Yupno) (Brown, 2012; Casasanto & Jasmin, 2012; Lakoff & Johnson, 1999; Li, 2017; Núñez & Sweetser, 2006; Núñez, Cooperrider, Doan, & Wassmann, 2012).

Cultural attitudes toward the past and the future likewise vary, with some groups placing relatively higher value on the past and others, on the future. Across a range of studies, past-focused groups at the cultural and subcultural level have been shown to spatialize time by placing past events in front of a fictional conceptualizer, while future-focused groups instead placed future events in front (e.g., Moroccans as compared with Spaniards: de la Fuente et al., 2014; students of history as compared with students of engineering, and visitors to an ancient art museum as compared with visitors to a contemporary art museum: Li & Cao, 2017b).

Taken together, these studies of space and time highlight the interplay of the general and the individual. Alongside the widespread tendency to conceptualize time in terms of space, there are multiple dimensions along which people may vary in the specifics of the conceptualization. Furthermore, the varied conceptualizations surface across a wide range of cognitive phenomena, including linguistic descriptions, gestures, and behaviors connected to consciously locating events relative to one another in space as a representation of time, further underscoring the importance of integrating the general with the individual.

4. Valence judgments

We likewise see variation embedded within a more general pattern in other metaphoric connections. On an individual level, Casasanto (2009) has found that right-handed people tend to make more positive judgments of stimuli presented on their right sides (in line with the metaphor GOOD IS RIGHT), while left-handed people instead favor stimuli presented on their left. Indeed, these preferences even surface in subconscious behaviors such as co-speech gesture, with political candidates having been observed to gesture with their dominant hands more often when conveying positive ideas, and with their nondominant hands more often when conveying negative ones (Casasanto & Jasmin, 2010). Taken together, these results suggest variation in the spatialization of valence judgments connected to individual variation in the relative dexterity of the hands, alongside the shared GOOD IS RIGHT metaphor. In a parallel fashion, Li and Cao (2017a) investigated the alignment of morality with vertical position (MORALITY IS UP). They found that religiously observant participants were faster than atheists when judging moral-related concepts presented in a high vertical position and

immoral-related ones presented in a low position. In this way, not only the spatial directions connected to valence, but also the tendency to draw upon a spatial dimension, may be subject to variation due to individual factors.

5. Integrating the specific with the general

As seen in this short survey, variation in perceiving, remembering, spatializing, and judging a multitude of concepts exists alongside commonalities including the biological bases of perception and the tendency to connect concepts drawn from different domains. Among the hallmarks of human beings are our diversity and our flexibility in adapting to a wide range of living situations, resulting in not only varying cultural norms, but also individual differences. However, while much has been done to catalog the effects of a diverse range of cultural, contextual, and individual factors, little has been done to map out the ways in which these factors may interact when individuals access their conceptual systems. To piece together the puzzle of human cognition, we need to build our understanding of the ways in which individual differences may temper generality (cf., Prather et al., 2022; Scott-Phillips & Nettle, 2022).

The need to integrate the specific and the general is becoming increasingly prominent across the Cognitive Sciences. At the psychological level, a range of studies have shown that fine-grained event knowledge plays a role in language comprehension from the earliest stages of processing, leading Elman (2009) to argue against distinguishing lexical knowledge from conceptual knowledge broadly construed. In line with this, we recently argued that metaphoric conceptualization and, by extension, language interpretation, involves a blending of conceptual knowledge drawn from cultural (including linguistic), contextual, and individual sources, in addition to conceptual material drawn from the metaphorical source and target domains (Duffy & Feist, in press; cf. Fauconnier & Turner, 1998, 2002). The integration of the specific and the general has even played a role in models of cultural evolution (e.g., Falandays & Smaldino, 2022), suggesting that this integration happens not only in the individual but also within human societies. The findings reviewed here strengthen these arguments, suggesting that a complex of factors combines with shared conceptual understanding to give rise to the ways in which we perceive, remember, and reason about a wide array of concepts. With this accumulating evidence, the time has come to shift our focus from merely cataloging the range of factors implicated in cognitive phenomena and to turn instead to an examination of the myriad ways in which these factors are woven together in real-time conceptual access.

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Conflict of interest

We have no known conflict of interest to disclose.

Note

1 Cognitive Science Society website: <https://cognitivesciencesociety.org/about/> (accessed 6 October 2022).

References

- Brown, P. (2012). Time and space in Tzeltal: Is the future uphill? *Frontiers in Psychology*, 3(212), 1–11.
- Casasanto, D. (2009). Embodiment of abstract concepts: Good and bad in right- and left-handers. *Journal of Experimental Psychology: General*, 138(3), 351–367.
- Casasanto, D., & Jasmin, K. (2010). Good and bad in the hands of politicians: Spontaneous gestures during positive and negative speech. *PLoS One*, 5(7), e11805.
- Casasanto, D., & Jasmin, K. (2012). The hands of time: Temporal gestures in English speakers. *Cognitive Linguistics*, 23(4), 643–674.
- de la Fuente, J., Santiago, J., Román, A., Dumitrache, C., & Casasanto, D. (2014). When you think about it, your past is in front of you: How culture shapes spatial conceptions of time. *Psychological Science*, 25(9), 1682–1690.
- Dolscheid, S., Shayan, S., Majid, A., & Casasanto, D. (2013). The thickness of musical pitch: Psychophysical evidence for linguistic relativity. *Psychological Science*, 24(5), 613–621.
- Duffy, S., & Feist, M. (2014). Individual differences in the interpretation of ambiguous statements about time. *Cognitive Linguistics*, 25(1), 29–54.
- Duffy, S., & Feist, M. (in press). *Time, metaphor, and language: A cognitive science perspective*. Cambridge: Cambridge University Press.
- Elman, J. (2009). On the meaning of words and dinosaur bones: Lexical knowledge without a lexicon. *Cognitive Science*, 33(4), 547–582.
- Falandays, B., & Smaldino, P. (2022). The emergence of cultural attractors: How dynamic populations of learners achieve collective cognitive alignment. *Cognitive Science*, 46, e13183.
- Fauconnier, G., & Turner, M. (1998). Conceptual integration networks. *Cognitive Science*, 22, (2), 133–187.
- Fauconnier, G., & Turner, M. (2002). *The way we think*. New York: Basic Books.
- Feist, M., & Cifuentes-Férez, P. (2013). Remembering how: Language, memory and the salience of manner. *Journal of Cognitive Science*, 144, 379–398.
- Gennari, S., Sloman, S., Malt, B., & Fitch, W. (2002). Motion events in language and cognition. *Cognition*, 83(1), 49–79.
- Gibbs, R. (2021). Book review, Jeannette Littlemore, *Metaphors in the mind: Sources of variation in embodied metaphor*. Cambridge: Cambridge University Press, 2020. *Language and Cognition*, 13(3), 494–496.
- Haspelmath, M. (1997). *From space to time: Temporal adverbials in the world's languages*. Munich: Lincom Europa.
- Henrich, J., Heine, S., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and Brain Sciences*, 33, 61–135.
- Lakoff, G., & Johnson, M. (1999). *Philosophy in the flesh: The embodied mind and its challenge to western thought*. New York: Basic Books.
- Li, H. (2017). Time on hands: Deliberate and spontaneous temporal gestures by speakers of Mandarin. *Gesture*, 16(3), 396–415.
- Li, H., & Cao, Y. (2017a). Who's holding the moral higher ground: Religiosity and the vertical conception of morality. *Personality and Individual Differences*, 106, 178–182.

- Li, H., & Cao, Y. (2017b). Personal attitudes toward time: The relationship between temporal focus, space-time mappings and real-life experiences. *Scandinavian Journal of Psychology*, 58(3), 193–198.
- Majid, A. M., Roberts, S. G., Cilissen, L., Emmorey, K., Nicodemus, B., O'Grady, L., Woll, B., LeLan, B., de Sousa, H., Cansler, B. L., Shayan, S., de Vos, C., Senft, G., Enfield, N. J., Razak, R. A., Fedden, S., Tufvesson, S., Dingemans, M., Ozturk, O., ... Levinson, S. C. (2018). Differential coding of perception in the world's languages. *Proceedings of the National Academy of Sciences*, 115(45), 11369–11376.
- Núñez, R., & Sweetser, E. (2006). With the future behind them: Convergent evidence from Aymara language and gesture in the crosslinguistic comparison of spatial construals of time. *Cognitive Science*, 30(3), 401–450.
- Núñez, R., Cooperrider, K., Doan, D., & Wassmann, J. (2012). Contours of time: Topographic construals of past, present, and future in the Yupno valley of Papua New Guinea. *Cognition*, 124(1), 25–35.
- Prather, W., Benitez, V., Kendall Brooks, L., Dancy, C., Dilworth-Bart, J., Dutra, N. B., Omar Faison, M., Figueroa, M., Holden, L. R., Johnson, C., Medrano, J., Miller-Cotto, D., Matthews, P. G., Manly, J. J., Thomas, A. K. (2022). What can cognitive science do for people? *Cognitive Science*, 46, e13167.
- Roberson, D., Davies, I., & Davidoff, J. (2000). Color categories are not universal: Replications and new evidence from a stone-age culture. *Journal of Experimental Psychology: General*, 129(3), 369–398.
- Scott-Phillips, T., & Nettle, D. (2022). Cognition and society: Prolegomenon to a dialog. *Cognitive Science*, 46, e13162.
- Slobin, D. (1996). From “thought and language” to “thinking for speaking”. In J. Gumperz & S. Levinson (Eds.), *Rethinking linguistic relativity*, pp. 70–96. Cambridge: Cambridge University Press.
- Talmy, L. (2000). *Toward a cognitive semantics, Vol. II: Typology and process in concept structuring*. Cambridge: MIT Press.