

Lexical acquisition: Symbol grounding and de-grounding to construct culture-specific lexical systems

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Lecture 1. The symbol grounding problem and its relation to lexical acquisition in young children

Issues:

- What is the (original) symbol grounding problem for the symbolic AI?
- How is it relevant to lexical acquisition in children?
- What are key questions for understanding lexical acquisition in a full scope?

Readings

Harnad, S. (1990). The symbol grounding problem. *Physica D: Nonlinear Phenomena* 42(1), 335-346.

Majid, A. (2015). Comparing lexicons cross-linguistically. In J. R. Taylor (Ed.) *The oxford handbook of the word*. Oxford University Press. Chapter 20.

Imai, M. (in press). The “symbol grounding problem” reinterpreted from the perspective of language acquisition. To appear in J. Zlatev, P. Konderak, & G. Sonesson (Eds.), *Establishing Cognitive Semiotics*. Berlin, Germany: Peter Lang.

Saji, N., Asano, M., Oishi, M., & Imai, M. (2015). How do children construct the color lexicon?: Restructuring the domain as a connected system. In D. C. Noelle, R. Dale, A. S. Warlaumont, J. Yoshimi, T. Matlock, C. D. Jennings, & P. P. Maglio (Eds.), *Proceedings of the 37th Annual Meeting of the Cognitive Science Society* (pp.2080-2085). Austin, TX: Cognitive Science Society.

Further readings

Carey, S., & Bartlett, E. (1978). Acquiring a single new word. *Papers and Reports on Child Language Development*, 15, 17-29.

Sandhofer, C. M., & Smith, L. (1999). Learning color words involves learning a system of mappings. *Developmental Psychology*, 35, 668-679

Ramscar, M., Yarlett, D., Dye, M., Denny, K., & Thorpe, K. (2010). The effects of feature-label-order and their implications for symbolic learning. *Cognitive Science*, 34, 909-957

Wagner, K., Dobkins, K., & Barner, D. (2013). Slow mapping: Color word learning as a gradual inductive process. *Cognition*, 127(3), 307–317.

Lecture 2. The Ontogenesis of Language I: How do first symbols emerge?

Issues:

- **Iconicity and embodiment in language**
 - **How arbitrary (or iconic) is language?**
- **How do human infants break into the semantic system of language?**
 - Multimodal integration and sound symbolism
- **Role of iconicity in word meaning acquisition**

Readings

Monaghan, P., Shillcock, M. H., Christiansen, M., & Kirby, S. (2014). How arbitrary is language? *Philosophical Transactions of the Royal Society B. Phil.*, 369, 1651, pii: 20130299, doi:10.1098/rstb.2013.0298

Imai, M., & Kita, S. (2014). The sound symbolism bootstrapping hypothesis for language acquisition and language evolution. *Philosophical Transactions of the Royal Society B.* 369,1651, 20130298, doi:10.1098/rstb.2013.0298

Imai, M., Kita, S., Nagumo, M., & Okada, H. (2008). Sound symbolism facilitates early verb learning. *Cognition*, 109, 54-65.

Further readings

Yueng, H., & Werker, J. (2013). Lip movements affect Infants' audiovisual speech perception. *Psychological Science*, 24, 603-612.

Asano, M., Imai, M., Kita, S., Kitajo, K., Okada, H. & Thierry, G. (2015). Sound Symbolism Scaffolds Language Development in Preverbal Infants. *Cortex*, 63, 196-205.

Corballis, M. C. (2010). Mirror neurons and the evolution of language. *Brain and Language*, 112, 25-35.

Maurer, D., Pathman, T., & Mondloch, C. J. (2006). The shape of boubas: sound–shape correspondences in toddlers and adults. *Developmental science*, 9(3), 316-322.

Vigliocco, G, Oerniss, P. & Vinson, D. (2014). Language as a multimodal phenomenon: Implications for language learning, processing and evolution. *Philosophical Transactions of the Royal Soceity B.*, 369, 20130292

Lecture 3. Inference of word meanings

Issues:

- **How do children learn word meanings at the initial and early stages of lexical development?**
- **When and how do children become aware of the aspects of information their native language care about in structuring the lexical system?**

Readings

Imai, M., & Haryu, E. (2004). The nature of word learning biases: From a cross linguistic perspective. In D. G. Hall & S. Waxman (Eds.), *Weaving a lexicon* (pp. 411-444). MIT Press.

Imai, M., & Gentner, D. (1997). A crosslinguistic study on constraints on early word meaning: Linguistic influence vs. universal ontology. *Cognition*, 62, 169-200.

Imai, M., Li, L., Haryu, E., Okada, H., Hirsh-Pasek, K., Golinkoff, R. M., & Shigematsu, J. (2008). Novel noun and verb learning in Chinese-, English-, and Japanese-speaking children. *Child Development*, 79, 979-1000.

Göksun, T., Hirsh-Pasek, K., Golinkoff, R. M., Imai, M., Konishi, H., & Okada, H. (2011). Who is crossing where?: Infants' discrimination of figures and grounds in events. *Cognition*, 121, 176-195.

Further readings

Bowerman, M. (1980). The structure and origin of semantic categories in the language learning child. In M. L. Foster & S. H. Brandes (Eds.), *Symbol as a sense: New approaches to the analysis of meaning*. (pp. 277-299). New York, NY: Academic Press.

Imai, M., & Haryu, E. (2001). Learning proper nouns and common nouns without clues from syntax. *Child Development*, 72(3), 787-803.

Imai, M., & Mazuka, R. (2007). Revisiting language universals and linguistic relativity: language-relative construal of individuation constrained by universal ontology. *Cognitive Science*, 31, 385-414.

Imai, M., & Masuda, T. (2013). The role of language and culture in universality and diversity of human concepts. In M. Gelfand, C.Y. Chiu, & Y. Hong (Eds.), *Advances in Culture and Psychology, Vol. 3* (pp. 1-61). Oxford University Press.

Lecture 4. Constructing the language-specific lexical system

Issues

- **How do children construct the language/culture-specific system of the lexicon?**
 - How do children find relations among words?

- How do children modify the meaning a word and delineate boundaries between neighboring words?
- How does the representation of a semantic domain develop as a connected system?
- How does the structure of a lexical domain in the native language affect word meaning acquisition in the second language?

Readings

Bowerman, M. (1978). Systemization of semantic knowledge: Changes over time in the child's organization of word meaning. *Child Development*, 49, 977-987.

Haryu, E., & Imai, M. (2002). Reorganizing the lexicon by learning a new word: Japanese children's interpretation of the meaning of a new word for a familiar artifact. *Child Development*, 73, 1378-1391.

Saji, N., Imai, M., Saalbach, H., Zhang, Y., Shu, H., & Okada, H. (2011). Word learning does not end at fast-mapping: Evolution of verb meanings through reorganization of an entire semantic domain. *Cognition*, 118, 45-61

Saji, N & Imai, M (2013). Evolution of verb meanings in children and L2 adult learners through reorganization of an entire semantic domain: The case of Chinese carry/hold verbs. *Scientific Research in Reading, Special issue: Reading in Chinese*, 17, 71–88. ISSN: 1088-8438 print/1532-799X online DOI: 10.1080/10888438.2012.689788

Further readings

Ameel, E., Malt, B. C., & Storms, G. (2008). Object naming and later lexical development: From baby bottle to beer bottle. *Journal of Memory and Language*, 58, 262-285.

Pavlenko, A. & Malt, B.C. (2011). Kitchen Russian: Cross-linguistic differences and first-language object naming by Russian-English bilinguals. *Bilingualism: Language and Cognition*, 14, 19-45.

Malt, B.C., Li, P., Pavlenko, A., Zhu, H., & Ameel, E. (2015). Bidirectional lexical interaction in late immersed Mandarin-English bilinguals. *Journal of Memory and Language*, 82, 86-104

Lecture 5. Ontogenesis of language II: The root of the ability to make inferences of word meanings

Issues:

- **What kind of inferences do children make in their learning of word meanings? (Is it really a problem of induction?)**
- **What cognitive functions make inference of word meanings possible?**
 - Theory of Mind
 - Causal reasoning
 - Abductive reasoning
- **The ontogenesis of heuristic reasoning used in the inference of word meanings**

Readings

Imai, M. (in press). The “symbol grounding problem” reinterpreted from the perspective of language acquisition. To appear in J. Zlatev, P. Konderak, & G. Sonesson (Eds.), *Establishing Cognitive Semiotics*. Berlin, Germany: Peter Lang.

Dugdale, N., & Lowe, C. L. (2000). Testing for symmetry in the conditional discriminations of language-trained chimpanzees. *Journal of the Experimental Analysis of Behavior*, 73, 5-22.

Douven, Igor, "Abduction", *The Stanford Encyclopedia of Philosophy* (Spring 2011 Edition), Edward N. Zalta (ed.), URL = <<http://plato.stanford.edu/archives/spr2011/entries/abduction/>>.

Thagard, P. (2007). Abductive inference: From philosophical analysis to neural mechanisms. In A. Feeney & E. Heit (Eds.), *Inductive reasoning: Experimental, Developmental, and Computational Approaches*. Cambridge University Press.

Further readings

Matsui, T., Rakoczy, H., Miura, Y. & Tomasello, M. (2009). Understanding of speaker certainty and false-belief reasoning: a comparison of Japanese and German preschoolers. *Developmental Science*, 12, 602-613

D'Amato, M. R., Salmon, D. P., Loukas, E., & Tomie, A. (1985). Symmetry and

transitivity of conditional relations in monkeys (*Cebus apella*) and pigeons
(*Columba*

livia). *Journal of the Experimental Analysis of Behavior*, 44, 35–47.

Tversky, A., & Kahneman, D. (1973). Availability: A heuristic
for judging frequency and probability. *Cognitive Psychology* 5, 207-232.