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REVIEWS

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Ruth Church, **Martha Alibali & Spencer Kelly (eds.)**, *Why gesture: How the hands function in speaking, thinking and communicating*. Philadelphia, PA: John Benjamins, 2017. Pp. vii + 433.

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Gesture is a prevailing topic in cognitive linguistics and cognitive science as it provides a 'window' into unspoken thoughts of individuals across a wide range of contexts (McNeill 1992). For further explorations in this field, the current collection investigates the effects and potential functions for both speakers and observers in different contexts.

The edited volume under review here consists of three parts. After the introduction, Part 1 examines how the gesture functions from the producer's view through two subsections: the function of gesture production for language (Chapters 2–5), and the function of gesture for cognition and social interaction (Chapters 6–10). Part 2 illustrates the functions of gesture comprehension for the observer (Chapters 11–16). The last part concludes the whole book with some theoretical implications (Chapters 17–18).

'The function of gesture production for language' is the first section of Part 1. The four chapters focus on how gesture activates image production and facilitates verbal organization and production. In Chapter 2, Martha Alibali, Amelia Yeo, Autumn Hostetter & Sotaro Kita describe how gesture promotes information packaging with the INFORMATION PACKAGING HYPOTHESIS (IPH, Kita 2000). According to this hypothesis, gesture facilitates the organization of spatio-motoric information, boosts our conceptualization, and provides theoretical explanations for the mechanisms of gesture in speech production. However, it fails to explain non-redundant gestures and the unspecified process of conceptualizations.

In Chapter 3, Aslı Özyürek investigates the communicative functions of gesture in the meaning-conveying with cross-linguistic evidence, experimental evidence and its linguistic effects. First, cross-linguistic evidence reveals that gestures of a single event are influenced by linguistic conceptualizations in different languages. Secondly, experimental evidence further examines factors that influence gestures other than culturally based conceptualizations. The results indicate that people from the same cultural background may present different gestural patterns in describing the same event because of online linguistic formulation and imagistic

representations. Thirdly, evidence shows that gesture not only reflects our cognitive development, it is also influenced by individual language development. These findings add to an emerging literature that gesture studies should bring linguistic typology into its scope because gesture is more apt at revealing conceptual variations than investigating linguistic evidence solely.

The Sketch Model is ubiquitously used in analyzing gesture-speech production for its ability to deliver communicative intention and the imagistic information from this intention. However, one shortcoming is that it only highlights unidirectional influences of language on co-speech gestures. To fill this gap, Jan Peter de Ruiter proposes the AR-Sketch Model through the Asymmetric Redundancy Hypothesis (ARH) in Chapter 4. This hypothesis posits that information in both iconic gesture and speech comes from the same communicative intention. In the modified model, the preverbal message is generated with both imagistic and propositional information, but the gesture is produced only through the imagistic information. The AR-Sketch Model thus solves intricate issues such as interpreting gestures without knowing the accompanying speech.

In Chapter 5 and its supplement, David McNeill discusses the origin of language through the growth point theory. The 'growth point' (GP) is the initial form of thinking for speaking. It involves the static dimension of language which is governed by linguistic and socio-cultural rules, and the dynamic dimension of gesture which is created with individual's thoughts and actions at the moment of speech. However, previous origin theories of language cannot explain the gesture-speech unity because they view language as a supplement of gesture rather than the combination of both dimensions. McNeill consequently proposes Mead's Loop: speech and gesture are equiprimordial.

Section 2 of Part 1 shifts to the role of gesture in cognition and social interaction. In Chapter 6, Susan Cook & Kimberly Fenn review the facilitation of gesture in memory and its underlying mechanisms. They argue that gesture benefits language comprehension, verbal memory and learning because it reduces cognitive load and enhances interlocutor's comprehension ability and memory. This view is consistent with the existing literature that gesture could facilitate information processing during communication and lexical storage in long-term memory (Demir & Goldin-Meadow 2016).

Autumn Hostetter & Rebecca Boncoddo illustrate how gesture and perceptual-motor representations strengthen each other in Chapter 7 with Gesture as Simulated Action (GSA). This theory proposes that when talking about physical experiences, speakers trigger perceptual-motoric representations with both linguistic productions and gestural representations. Their illustration answers *Why gesture?* well: on the one hand, gesture relieves our cognitive load as the activation of perceptual-motor representation bolsters gesture during speech production; on the other hand, gesture is part of cognition because it consolidates the perceptual-motor representations in our thinking.

In Chapter 8, Mitchell Nathan specifies the creative function of gesture through 'action–cognition transduction', whereby an action affects the cognitive state,

which in turn modulates a succession of future actions. Gesture is a special type of action which exerts an influence on our thinking process and behavior. Compared with actions, gestures can foster learning more effectively because they enhance problem-solving strategy and verbal inference. However, Nathan also suggests the following improvements for action-cognition transduction: (i) actions shall not be over-emphasized by educators in children's development; (ii) non-communicative actions may affect perception; and (iii) gesture training promotes learners' ability in abstracting meanings.

Although embodied cognition stresses the spatial functions of gesture, Leanne Beaudoin-Ryan further expands the function to the non-spatial dimension in Chapter 9. Based on studies in perspective-taking gestures in moral reasoning, this chapter shows that co-speech gestures in non-spatial tasks can exhibit the same effects as gestures in spatial tasks, such as producing cognitive benefits, facilitating learning and intensifying the willingness to learn. Thus, the non-spatial function of gesture facilitates the understanding and grounding of abstract concepts by externalizing mental images and representations.

The coordination of joint actions, especially in face-to-face communication, is an underexplored area in previous studies. In Chapter 10, Judith Holler & Janet Bavelas delve into both speech and gesture from the perspective of personal common ground (knowledge shared by interlocutors based on their prior experience or current situation) and incremental common ground (knowledge shared by interlocutors based on their conversational interaction). In their review of related studies on personal common ground, the results show a reduction of both words and gestures, as well as sloppier gestures. However, on incremental common ground, literature yielded mixed results. The authors argue that a primary reason for this inconsistency lies in different research designs. Further experimental as well as theoretical exploration is still needed for a definite answer.

The second part turns to the observer in different contexts. In Chapter 11, Spencer Kelly discusses the observer's comprehension of gesture–speech integration from the following three perspectives: components of language, levels of analysis, and timeframes of integration. Regarding the importance of gesture in language comprehension, and how gesture can be part of, and be separated from language, Kelly's discussion shows that some linguistic components are deeply connected with gestures, while others are less so. At the semantic level, concrete objects are closely connected with gesture while the abstract parts are less relevant; at the phonetic level, gesture may not cooperate well with segmental processing in learning new sounds.

The comprehension of gesture functions can also be enhanced by studies on humanoid robots or virtual characters. In Chapter 12, Stefan Kopp reviews the functions of gesture in human–agent interactions. First, robots' gestures can enhance learners' memory in performance tasks. Second, co-speech gestures facilitate the interaction between human and agent and improve the intelligence of the computational system. Finally, synthetic gesturing enhances qualities of agent performances in social perception. Kopp closes this chapter with two questions and directs future possibilities: (i) despite the facilitations of synthetic

gestures, future studies should focus on their social effects on higher quality of communication, and (ii) computational modelling of gesture patterns and features should be generalized and tested to deepen our understanding of gesture.

The next four chapters discuss gestures in different settings: school (general learning and STEM classrooms), clinical interaction, and communication between native and non-native speakers. In Chapter 13, Mitchell Nathan, Martha Alibali & Ruth Church discuss how making and breaking common ground establishes reviewing and learning knowledge. In Chapter 14, Melissa Singer summarizes students' concretization of abstract knowledge through gestures. In addition, several unsolved problems are also listed: the multimodal process and individual differences in learning. To address these issues, Singer calls for detailed explorations of interactions in natural classroom settings. In Chapter 15, Eve LeBarton & Jana Iverson review literature on children with impairment, autism, Down Syndrome and language delays. To compensate for these difficulties, children produce more gestures at pre-school and school stages. Gesture thus enhances their learning, communication and social interactions. Gale Stam & Marion Tellier examine the functions of co-speech gestures during pauses through their analysis of interactions between native speakers and non-native speakers in Chapter 16. In their observation, when interlocutors are both native speakers, gesture during pauses facilitates communication as turn-taking or encouragement, and when native speakers communicate with non-native speakers, gesture from both parties during pauses promote comprehension by stressing the key words. This comprehension-oriented function provides pedagogical and theoretical implications: gesture deepens our understanding of the intended meaning during pauses, and also facilitates the exploration of asymmetrical interactions, such as communications between parents and children, or doctors and patients.

Chapters 17 and 18 constitute the last part. In Chapter 17, Miriam Novack & Susan Goldin-Meadow continue the discussions on gesture as representational actions with three questions: the design features of gesture, the distinctive functions of gesture, and potential research directions. The closing chapter, Chapter 18 by Ruth Church & Susan Goldin-Meadow concludes the previous 17 chapters with four themes summarized: multiple levels of analysis, different time frames, diversified method, and gesture functions for both producer and observer.

The ultimate goal of this volume is 'to understand not only the mechanisms of gesture, but its possible functions as well' (5). Undoubtedly, this book reaches its aim with its detailed illustrations on gesture theories, and the wide scope of topics from daily communication to human-computer interaction. When linguists embrace gesture mainly for studying conceptual metaphor and pedagogical consultations, theories in this volume would facilitate theoretical building for cognitive linguistics.

However, while this volume has completed its goal to answer *Why gesture?*, the readability would be highly enhanced if it could rearrange some chapters. First, Chapter 17 would be preferable as an introductory chapter. With discussions on the differences between gesture and other actions, and the functions of gesture in communication, learning and problem-solving, this chapter is highly readable

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for beginners. Second, as Chapters 10, 13 and 14 are all based on the 'common ground', the insertion of Chapter 11 and 12 in between may disrupt the thematic continuity and thus cause difficulties for readers.

Despite this flaw in organizing chapters, this book should be recommended as advanced reading for cognitive linguists who are well versed in gesture studies. When scholars of gesture studies still benefit from models of synthetic gestures, computer scientists have already stepped forward into widgets, augmented reality (AR) and other advanced fields (Kurosu 2014). Thus, researchers in this field should be alert of the cutting-edge findings of gesture in human–machine interaction. Overall, this collection provides both valuable theoretical syntheses of current research and practical illustrations in different settings. Thus, it is highly recommendable for readers interested in gesture studies, cognitive linguistics and cognitive science.

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