

Editorial: Action effects in perception and action

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Good scientific theories should be simple, valid, and stimulating. It seems that ideomotor theory, which has been the core theme behind the research topic on “*Action Effects in Perception and Action*”, has done a fairly good job in terms of these three criteria. First, it is rather simple: Goal-directed actions are assumed to be selected and addressed by anticipating their sensory consequences; crucially, learned bidirectional associations between sensory representations and motor commands ensure that these anticipations eventually result in overt behavior. Secondly, numerous observations comply with its basic predictions, derived from philosophical analyses of the 19th century (cf. Pfister & Janczyk, 2012; Stock & Stock, 2004). Accordingly, the validity of ideomotor theory has been documented by extensive empirical research over the last decades (e.g., Elsner & Hommel, 2001; Hommel, Müsseler, Aschersleben, & Prinz, 2001; Kunde, 2001; see also Shin, Proctor, & Capaldi, 2010).

Thirdly, ideomotor theory (still) seems to stimulate contemporary research. Otherwise the impressive range of topics that have come together in the present research topic can hardly be explained. These topics range from investigations of how attention and perception are modulated by intentions and expectations (KEMPER ET AL. 2012; WYKOWSKA & SCHUBÖ, 2012), to applied settings such as aging and tool-use (SUTTER, LADWIG, OEHL, & MÜSSELER, 2012), task-switching (LUKAS, PHILIPP, & KOCH, 2013), to social influences on action coding (COLZATO, DE BRUIJN, & HOMMEL, 2012; NISHIMURA & MICHIMATA, 2013) and a developmental perspective on action effects in object manipulation (KNUDSEN, HENNING, WUNSCH, WEIGELT, & ASCHERSLEBEN, 2012). These new perspectives are backed up by studies on two prevailing questions in ideomotor research: The formation of action-effect associations (HERWIG & WASZAK, 2012; JANCZYK, HEINEMANN, & PFISTER, 2012; RUGE, KREBS, & WOLFENSTELLER, 2012) – including a first step towards addressing individual differences in ideomotor learning (MUHLE-KARBE & KREBS, 2012) – and the role of such associations for action control (GASCHLER & NATTKEMPER, 2012; WALTER & RIEGER, 2012; ZIESSLER, NATTKEMPER, & VOGT, 2012).

Furthermore, three notable articles explore theoretical refinements of ideomotor theory by addressing the virtue of visuomotor priming for ideomotor research (THOMASCHKE, 2012), hierarchical coding of action-effect relations (ONDOBAKA & BEKKERING, 2012) and computational constraints for ideomotor theory (HERBORT & BUTZ, 2012).

In the light of these and other recent empirical and theoretical advances (cf. Shin et al., 2010), it seems as if 21st century ideomotor theory accounted for almost all areas of cognitive psychology. On careful consideration, however, it also seems as if a particular area is still underrepresented in the ideomotor community, and this area is the concept of working memory. Whereas there are a several short hints to “memory traces” or “long term memory” throughout the articles of the research topic, the concept of working memory is mentioned only a single time (THOMASCHKE, 2012, p. 4). Arguably, however, anticipated action effect must be represented somewhere in the cognitive architecture – and working memory appears a likely place for these representations. In our view, this state of affairs is indicative of the current theoretical state and calls for a better exchange between the respective scientific communities.

Similarly, while the sketched developments and directions are admirable on their own, they also pose a new challenge for scholars of action and perception. This challenge relates to an explicit treatment of the relations – commonalities and differences – of the ideomotor approach to other general frameworks for action and perception. For instance, the neuroscientific approaches of predictive coding (Rao & Ballard, 1998), the Bayesian brain (Knill & Pouget, 2004), and the free-energy principle (Friston, 2010) seem to share many features with the principles of effect-based action control even though the different accounts are rarely discussed in the same place (and are nourished by distinct scientific communities). In the same vein, relations to accounts for the perception of self-generated action effects (Baess, Horváth, Jacobsen, & Schröger, 2011; Haggard, Clark, & Kalogeras, 2002; Moore & Obhi, 2012) need a more explicit treatment, and so do the relations to mathematical models of human motor control (Wolpert & Ghahramani, 2000).

In the meantime, we would like to thank all authors who joined the enterprise of this research topic, and all reviewers who commented on the presented papers. It was a pleasant enterprise from beginning to end, i.e., from sending out the first invitations up to the final, joint action effect which is the research topic itself.

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