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Commentary

Uni-Dimensional or Multi-Dimensional? Empirical Evidence for Distinguishing between Different Aspects of Intuition☆

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Some researchers refer to intuition as a multi-dimensional construct while others refer to it as a uni-dimensional construct. In the spirit of Hoffrage and Marewski's (2015) discussion of the various aspects of intuition, we call for finer distinctions between multiple dimensions. We further review evidence suggesting that several dimensions can be separated on an empirical basis. We hope to inspire more theoretical and empirical research on the multi-dimensionality of intuition.

Keywords: Intuition, Cognitive-style, Systematic

The special issue on modeling and aiding intuition presents a sample of the rich and diverse perspectives on the notion of intuition in decision-making. Reviewing and integrating across the diverse perspectives, Hoffrage and Marewski (2015) provide a list of dichotomies used to contrast intuitive and non-intuitive decision-making. These dichotomies invite a multi-dimensional conceptualization of intuition. Even though recent research (e.g., Evans, 2008; Glöckner & Witteman, 2010; Pretz & Totz, 2007) has tried to disentangle some dimensions of intuition, the multi-dimensional perspective is not yet well established.

First, not all researchers adopt a multi-dimensional perspective to conceptualize and study intuition. Some researchers focus on a single aspect of intuition. For example, in this special issue, Chassot, Klöckner, and Wüstenhagen (2015) focus on unconscious decision-making; Brown and Daus (2015) focus on holistic decision-making; and Baron, Scott, Fincher, and Metz (2015) focus on effortless decision-making. Other researchers refer to multiple components of intuition, yet integrate across them to create a unified uni-dimensional conceptualization (e.g., Kahneman, 2011). The dilemma between the unified uni-dimensional and the multi-dimensional perspectives is noticeable when comparing papers in this special issue. Some researchers in this special issue refer to the unconscious and holistic dimensions interchangeably, reflecting the unified, uni-dimensional, perspective (e.g., Klein, 2015; Pachur & Spaar, 2015), while others refer to consciousness and holistic as distinct, possibly parallel dimensions, reflecting the multi-dimensional perspective (e.g., Sun, 2015).

Second, there is no agreement on the relevant dimensions to conceptualize intuition. Researchers adopting a multi-dimensional perspective offer different dimensions (see Table 1). In addition, researchers conceptualizing intuition based on a single, specific, aspect of intuition (reviewed above) fail to provide information on converging and diverging dimensions. A comprehensive multi-dimensional framework, integrating across single dimensions and across existing multi-dimensional conceptualizations (see Table 1) is yet to be developed.

Finally, the field is currently short of empirical evidence that allows for a comparison between the uni-dimensional and the multi-dimensional perspectives. The uni-dimensional perspective should be preferred, for parsimonious reasons, to the extent that all dimensions yield similar outcomes. In contrast, multi-dimensionality should be preferred if outcomes differ across dimensions. In our own research we focused on four dimensions: (a) unconscious vs. conscious; (b) holistic vs.

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Table 1
Examples of Multi-Dimensional Conceptualizations of Intuition

Hoffrage and Marewski (2015)	Enlightenment/Romanticism, Reason/Emotion, Objectivity/Subjectivity, Inferences/Qualia, Analytic/Holistic, Taylorism/Universal scholarship, System 2/System 1, Dichotomies/Dialectics, Science/Art
Evans (2008)	Consciousness, Evolution, Functional characteristics, Individual differences
Glöckner and Witteman (2010)	Associative intuition, Matching intuition, Accumulative intuition, Constructive intuition
Pretz and Totz (2007)	Affective, Heuristic, Holistic

systematic; (c) fast and effortless vs. slow and effortful; and (d) affective vs. objective.

We took an experimental approach to facilitate intuitive decision-making (Rusou, 2012), using manipulations relying on different dimensions: *Reason-Analysis* (Wilson & Schooler, 1991), *Feeling* vs. *Deliberation* (Pham, Cohen, Pracejus, & Hughes, 2001), *Deliberation without attention* (Dijksterhuis, Bos, Nordgren, & van Baaren, 2006), and *Cognitive load* (Lee, Amir, & Ariely, 2009). Performance in an intuitive decision task (impression formation from facial appearance, Ayal, Rusou, Zakay, & Hochman, 2015; Rusou, Zakay, & Usher, 2013) differed, depending on the manipulated dimension. Facilitating holistic (vs. systematic) or affective (vs. objective) thinking increased decision quality, whereas facilitating unconscious (vs. conscious) or effortless (vs. effortful) thinking had no such effect.

Focusing on individual differences (Amit et al., unpublished data), we distinguish between the holistic (vs. systematic) dimension and the effortful dimension. We took a meta-analytic approach to compare the associations between the sub-scales of The *Rational Experiential Inventory* (REI; Epstein, Pacini, Denes-Raj, & Heier, 1996) and those of the *Thinking and Working Style* (TWS; Sagiv, Amit, Ein-Gar, & Arieli, 2014; Sagiv, Arieli, Goldenberg, & Goldschmidt, 2010). Both scales measure the intuitive style using items reflecting a mixture of the unconscious and holistic dimensions. The measures differ, however, with respect to the second (non-intuitive) style. The REI relies on the *Need for Cognition* scale reflecting the effortful dimension whereas the TWS taps into the systematic dimension (see Table 2).

Table 2
Exemplary Items Measuring Intuitive and Non-Intuitive Cognitive Styles

	REI (Epstein et al., 1996)	TWS (Sagiv et al., 2010)
Intuitive style	I believe in trusting my hunches.	I often follow my instincts.
	I can usually feel when a person is right or wrong even if I cannot explain how I know.	I often make a good decision without really knowing why I made this choice.
Non-intuitive style	I prefer to do something that challenges my thinking abilities rather than something that requires little thought.	Before I do something important, I plan carefully.
	I do not like to have to do a lot of thinking (reversed).	I usually make decisions in a systematic and orderly way.

The correlations we found between the intuitive and non-intuitive sub-scales of the REI and of the TWS differed substantially. We found a consistent lack of association between the effortful dimension and the holistic-unconscious dimension (zero correlations between the subscales of the REI). In contrast, the systematic aspect was in opposition to the holistic aspect (medium negative correlations between the subscales of the TWS).

In another meta-analysis integrating across multiple survey samples (Amit, Arieli, & Porzycki, 2016), the difference between the effortful/effortless and the systematic/holistic dimensions was further exemplified in the distinct pattern of associations found with other individual differences (i.e., personal values; Schwartz, 1992). Specifically, as expected, the effortful dimension exhibited the strongest positive correlation with self-direction and the strongest negative correlation with conformity values, whereas the systematic dimension exhibited the strongest positive correlation with security and strongest negative correlation with stimulation values.

Taken together, our research indicates that conclusions based on one dimension may not necessarily generalize to other dimensions. We thus provide preliminary empirical support advocating for the adoption of a multi-dimensional perspective to conceptualize and study intuition. The papers in the special issue on modeling and aiding intuition portray a complex view on intuitive decision-making. On the one hand, intuition inspires creativity and implementation of experience-based tacit knowledge. On the other hand, intuition subjects decision-makers to reasoning errors. The usefulness of the multi-dimensional over the uni-dimensional perspective should be developed further and more empirical investigation is needed. However, we now wonder, might following a multi-dimensional perspective prove useful in explaining the contradicting assertions on the practical implications of intuitive decision-making? For example, might the beneficial aspects of intuitive decision-making result from the holistic/systematic dimension while the detrimental aspects result from the effortless/effortful dimension?

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