INTRODUCTION

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Over the past 15 years, and after many years of avoidance or neglect, interest in intuition has been proliferating across psychology and in allied scientific disciplines. References to intuition appear in cutting-edge research contexts in cognitive psychology and cognitive science (especially decision science), neuroscience, developmental psychology, linguistics, management, education, nursing, and economics. To understand why this is surprising, even remarkable, we need only to examine the very different view of intuition's place in relation to scientific psychology in the early years of the discipline. One example of this view is embedded in John Laird's (1917) essay titled "Introspection and Intuition," published in *The Philosophical Review*. Laird referenced philosopher Bergson's followers "who have abandoned scrip, shoes, and staves to follow him single-mindedly in all things" and said that they

> believe that psychology is a science touched with the palsy of the intellect, and tarred with that practical brush which can never find a use for truth, while intuition pertains to any metaphysics that understands itself, and consequently is beyond the scope of scientific psychology.
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> (Laird, 1917, p. 496)

Bergson was at the time a hugely influential philosopher, the "live wire in contemporary philosophy" (Luce, 1922, p. 1). Because intuition was central to Bergson's philosophy – specifically his metaphysical commitments – the idea Laird expressed is that intuition, given its philosophical roots, is neither a suitable focus for psychology nor amenable to scientific investigation. Thus, the relatively recent infusion of intuition into experimental psychology and allied disciplines represents a dramatic change of some variety, most likely in the attitude toward and understanding of intuition.

AN ALLURING MUDDLE

The increased openness toward intuition in scientific contexts comes at a price: a loss of clarity that borders occasionally on incoherence. Intuition has never been an easy term or one for which definitions are consistent. In *Intuition and Science*, Mario Bunge (1962, p. 5) claimed that few words are as ambiguous as intuition, noting that the unqualified use of intuition "is so misleading that its expulsion from the dictionary has been earnestly proposed." The past 50 years have brought only an upsurge in associated muddle despite recent efforts to offer greater conceptual analysis (Davis-Floyd & Arvidson, 1997; Glöckner & Witteman, 2010; Gore & Sadler-Smith, 2011; Hodgkinson, Langan-Fox, & Sadler-Smith, 2008; Hogarth, 2010).

Contributing to this confusion is the popular appeal, a general allure surrounding intuition. The allure of intuition appears to be long-standing. In the 19th century, James McCosh (1882, p. v) prefaced his careful "inductively investigated" treatment of intuition by noting that "[t]here is a constant reference in the present day to intuition." The term is tossed about evermore facilely in our own time, in reference to all manner of phenomena and even commodities. That is, intuition or some variant (intuit, intuitive) is the namesake of a pop song, a fragrance, a cruise, a market transaction "app," training tapes, guidebooks, workshops, and personal growth courses. A decade ago, David Myers proclaimed intuition to be a new "cottage industry," pointing to the emergence of intuition authors and trainers (self-titled "intuitives") in education and business, along with practical guides to personal fulfillment and decision making that draw on intuition (Myers, 2002). Applications continue to be made to trading, spirituality, healing, relationships, and personal effectiveness. In some contexts, intuition is suggestive of special powers, mystical awareness, creativity, inspiration, presentiment, empathic attunement – a royal road to wisdom. It is also associated with the everyday stuff of hunches and "gut feelings," warm "heart" reactions over cool "head" considerations.

And what is to be made of the fact that intuition has made important appearances in some of the most significant texts in Western (and other) philosophy across many eras of thought? That intuition is important philosophically is exceedingly clear (Osbeck, 1999). A few examples will suffice to make the point here. There is a long tradition by which intuition is associated with "truths, principles, which originate in the native power, or are seen in the inward light of the mind" (McCosh, 1882, p. 1). In other contexts it is not only a holding (a principle) but also an *act*: Descartes' (1994) *Rules for the Direction of the Mind* (*De Regulae*) affirms intuition

and deduction as *the* intellectual acts enabling the acquisition of knowledge, with intuition the more fundamental of the two. Kant (1990) begins the *Critique of Pure Reason* by claiming intuition and conception as cognitive processes that cooperatively constitute all knowledge, establishing these as the core of his synthesizing, transcendental epistemology. Intuitionism has been a prominent strain in ethical theory and has played a very important and complex role in the philosophy of mathematics (Brouwer, 1913, 1952; Heyting, 1956). Locke (1964) and Hume (1981) both made reference to a cognitive event called intuition, depicting it as perception of connection between ideas. Many more examples could be given.

It should be obvious from these diverse referents that there is no single sense of "intuition" in play in contemporary scholarship, let alone across historical and philosophical contexts. As Gore and Sadler-Smith (2011, p. 1) argue, intuition is not "unitary." The diversity should not be terribly surprising in itself, because no word in ordinary language use has a fixed and unwavering meaning. But as a scholarly or empirical concept, referents for intuition are curiously dispersed. Intuition is variably identified as a process (intuitive judgment), a product (intuitions of, or that), a foundation or precondition for knowledge, and a method for obtaining it. Philosophically it is an act of "the conception of a clear and attentive mind, which is so easy and distinct that there can be no doubt about what we are understanding" (Descartes, 1994, p. 3); psychologically it is more frequently an unconscious, automatic, murky, or inaccessible process (Bargh & Chartrand, 1999; Hogarth, 2001). In groundbreaking studies it has been theorized as the basis of expertise (Dreyfus & Dreyfus, 1980, 1986), but it has also been conceived as a characteristic of children's "naïve" theories of the material and social worlds (Carey, 1985; Gopnik & Meltzoff, 1997). It has been called a "philosophical cul-de-sac" (Luce, 1922, p. 3), the end of the line for justification, a point beyond which one cannot go, an ultimate point of bedrock that unshackles us from infinite regress and thus the foundation and glue of mathematical reasoning and logical law. Conversely, it is more recently associated with "processes alien to logic" (Gigerenzer, 2007, p. 3). Intuition is used to reference vague first impressions or what seems initially to be the case, without reflection (e.g., "My intuition is that there is something wrong with the argument but I am unable to say what it is"). It is sometimes equated with common sense, sometimes with the rapid identification of benefit or danger necessary to survival. It is linked with a rapidity of judgments both perceptual (Bolte & Goschke, 2008) and semantic (Topolinski & Strack, 2009).

The inconsistencies and veritable contradictions emerge within as well as between the vastly different scholarly contexts in which intuition figures prominently. First, the philosophical literature on intuition is itself immense and dense, with no unified concept or theory of intuition across (indeed, often within the work of) philosophers or philosophical problems. Even so, whatever consistencies might be found in philosophical conceptions of intuition, these conceptions and the theory in which they are embedded are largely ignored in contemporary conceptual and empirical work on intuition. A second problem is that a meaningful conception of intuition is often taken for granted without examination in contemporary research contexts. Analysis of meaning is frequently limited to the association of intuition or intuitive reasoning with certain phenomena that are themselves hopelessly vague (e.g., feelings, associations, hunches, gut reactions, fast thinking), and/or to an asserted contrast between intuition/intuitive processing and other phenomena such as, most typically, reflection, deliberation, analysis, and slow thinking. Research on cognitive biases recognizes intuitive judgments as occupying a space between perception and controlled steps of reasoning – a hazy, affect-laden borderland (Gigerenzer, 2007; Kahneman & Frederick, 2002; Tversky & Kahneman, 1982). Plessner, Betsch, and Betsch (2008), in a preface to their edited volume, *Intuition in Judgment and Decision Making*, identify

> an almost endless list of fascinating phenomena and concepts that psychologists have brought into relation with a general concept of intuition as a distinct mental device. Among others, the list includes unconscious perceptions, "blindsight," pattern recognition, instinct, automatic processing, experiential knowing, tacit knowledge, religious experiences, emotional intelligence, non-verbal communication, clinical diagnoses, "thin slices of behavior," spontaneous trait inferences, the "mere exposure effect," the primacy of affect, "thinking too much," priming, feelings as information, implicit attitudes, expertise, creativity, and the "sixth sense." (pp. vii–viii)

Attempts to offer a summary of empirical work on intuition, including some ambitious efforts to compare its variants and analyze its fundaments (e.g., Bastick, 1982; Claxton, 2001; Davis-Floyd & Arvidson, 1997; Myers, 2002; Westcott, 1968), reflect this conceptual heterogeneity. Hodgkinson, Langan-Fox, and Sadler-Smith (2008), Gore and Sadler-Smith (2011), and Sadler-Smith (2008) provide impressively comprehensive analyses of the conception of intuition across psychological contexts but make little contact with the philosophical history of intuition. Moreover, existing reviews and

efforts at comparative analysis display little agreement as to the conceptual boundaries of the phenomenon in question. In sum, there is no consensus about whether intuition and the aforementioned related concepts such as hunches and gut reactions reference phenomena that are distinct from intuition. And there is no consensus on intuition's relation to a host of other concepts (e.g., insight, instinct, presentiment, and self-evidence).

HISTORICAL OVERVIEW: PHILOSOPHICAL INTUITION

Intuition is associated historically with the preconditions of knowledge: of the world, of one's ideas, of God. There is general agreement that the Latin terms *intuitus* and *intuitio* were introduced into philosophy by the Scholastics, notably Anselm, Scotus, and later Ockham (see Hintikka, 2003). In a critique of the possibility and meaningfulness of "direct" knowledge, Peirce (1868) located the "technical" (philosophical, historical) use of the term *intuitus* in Anselm's *Monologium* (approximate date 1076), introduced to distinguish knowledge of finite things from knowledge of the infinite (God). Here is what Peirce says specifically in a footnote to his paper "Questions Concerning Certain Faculties Claimed for Man" (1868), with his annotations:

> The word *intuitus* first occurs as a technical term in St. Anselm's *Monologium*. [*Monologium*, LXVI; Cf. Prantl, III, S. 332, 746n.] He wished to distinguish between our knowledge of God and our knowledge of finite things (and in the next world, of God, also); and thinking of the saying of St. Paul, *Videmus nunc per speculum in aenigmate: tunc autem facie ad faciem*, [LXX], he called the former *speculation* and the latter *intuition*. . . . In the middle ages, the term "intuitive cognition" had two principal senses; 1st, as opposed to abstractive cognition, it meant the knowledge of the present as present, and this is its meaning in Anselm; but 2nd, as no intuitive cognition was allowed to be determined by a previous cognition, it came to be used as the opposite of discursive cognition (see Scotus, *In sentent.*, lib. 2, dist. 3, qu. 9), and this is nearly the sense in which I employ it. This is also nearly the sense in which Kant uses it, the former distinction being expressed by his *sensuous* and *non-sensuous*. (See *Werke*, herausg. Rosenkranz, Thl. 2, S. 713, 31, 41, 100, u.s.w.) An enumeration of six meanings of intuition may be found in Hamilton's *Reid*, p. 759.
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> (Peirce, 1868, p. 103, note 1)

In addition to Peirce's acknowledgment that there are various meanings of intuition, his explication of its origins is instructive. Intuition as a term, concept, or category thus arises first, at least technically (that is, the use of

the word "intuition," not the expression of a similar idea in other words), in relation to a theological distinction, as a difference in our means of apprehending the finite and the infinite. The crucial issues are directness and, with directness, a certain immunity from doubt. There is an implication that knowledge of "the present" is caused by the presence of the extant object. Thus, intuition involves "knowing the object" directly – not abstractly or conceptually, but rather by means of a simple presentation of its being. It enables inferences (abstractions) about the object, although, importantly, the inferences are not themselves intuitive but simply made possible because of intuition. Theologically, then, intuition implies in some sense a "direct" knowledge of God, not rooted in theology or speculation, but rather a "seeing." The extent to which this is thought to be possible varies by religious tradition. In the Christian context in which the distinction Peirce references emerges, direct knowledge of God is possible only upon death. On earth, we see through a glass darkly, through speculation, with only the future promise of direct sight.

The metaphor of intellectual vision is hugely important to philosophical conceptions of intuition. Intuition is, most simply, a kind of seeing what is present, what is in front of us. Experientially it can only be described with metaphor or analogy (sight), because it lies at the base of all description (and experience). There is simplicity in "seeing"; one cannot detect any processes that precede it and cannot adequately describe the activity of seeing, but one can identify what follows from it (what is seen). It enables additional processes we might call cognitive: reasoning about what is seen, that is, considering its meaning and value as well as emotional response.[1]

Here we should pause for a moment to consider our unit of analysis for this text. We have been talking about intuition as a term, a word, and have located what is credited to be its original philosophical context of use. Terms in earlier texts expressive of a direct cognitive event of this sort – expressive of some portion of knowledge picked up directly or "given" rather than acquired – are labeled "intuition" by some translators (e.g., Irwin, 1988; Ross, 1924; Sandbach, 1989), and in Plato there are clear references to something like intellectual vision or "seeing" with the mind's eye (see Osbeck, 1999). Indeed, the idea of "direct apprehension" appears to be a common feature among the otherwise very divergent senses and uses of intuition in the philosophical literature alone (see Osbeck, 1999, 2001 for specific examples and analysis to this effect).

"Directness" has epistemic as well as experiential implications. For many philosophers, then, the *products* (intuitions) of the direct *process*

(intuition) have special epistemic status. They are not further reducible; they are the end of the road, that which needs no further grounding, no additional justification through another belief. Rather, they serve as the grounding for all inference, all further reasoning.

To recap: A crude summary of what is common to the divergent senses or versions of intuition across at least a broad sample of its philosophical history is that of an intellectual faculty of direct apprehension, one contrasted, that is, with inference or deduction (which are indirect). But what is it for apprehension (grasping) to be *direct*? A mental event alleged to be direct or immediate is – by definition – not mediated by other events or processes, and it acts in some way to support further cognitive activity, that which is indirect. Direct implies that something occurs with no interference or intervention; it refers to unmediated apprehension, judgment without inference, apprehension without an intervening thought or image (memory): "present as present," not "*re*"-presentation. It is this feature that established the special *function* of intuition – in each case, some form of epistemic foundation – even if philosophers have disagreed on the source and degree of security of that foundation.

Differences in philosophical accounts of intuition pertain principally to the nature of what is intuited, that is, whether those objects we apprehend directly through intuition are innate objects of intellect or acquired objects of sense experience, and thus whether intuitions, the products of the intuitive faculty, are to be taken as certain, even indubitable, or as merely contingently true, subject to disconfirmation with additional evidence. However, the fantasy of an ultimate foundation, an originative position and end that demands or commands adherence, served important social and intellectual functions for many years. Its assumed epistemic authority prompted appeals to intuition as a basis for jurisprudence in the 17th and 18th centuries (e.g., Cudworth, 1996) and, in a reformed version, as a foundation for ethics in the early 20th century (Moore, 1903; Ross, 1930).

And yet, intuition fell out of philosophical favor for much of the 20th century, at least in the analytic tradition. It has rebounded of late in the context of moral reasoning (Haidt, 2007) and in the relatively recent trend of "experimental philosophy" in which "lay intuitions" are analyzed empirically to reveal existing biases; these descriptive data are taken from traditional questions in philosophy (see Ichikawa, Chapter 9 in this volume). Several recent philosophical volumes aim to explicate the role of intuition in high-level reasoning, both philosophical and scientific (Chudnoff, 2014; Dennett, 2013).

HISTORICAL OVERVIEW: PSYCHOLOGY AND COGNITIVE SCIENCE

In view of its dense and varied philosophical meanings, and especially the spurious, difficult notion of directness with which it is bound, it is not surprising that intuition was more or less a casualty of early 20th-century psychology's efforts to purge itself of metaphysical baggage. A 1937 paper attempting to incorporate intuition into the field of medical psychology summarizes the conflict rather well, as the author launched his discussion of intuition's relevance with recognition of the oddity of this endeavor:

> The subject of intuition must at first sight seem a rather unpopular one to treat in a society of learned medical men. The word seems quite natural in relation to art or religion or even philosophy, but it seems more or less in contradiction to science. (Van der Hoop, 1937, p. 255)

Few mentions, much less direct investigations of intuition, whether speculative or experimental, appear in psychological literature prior to the late 1940s.

Early Studies

As is the case for most phenomena, there are some interesting exceptions to this trend nonetheless. Some efforts were made to investigate intuition experimentally in psychology, and these are quite revealing, suggestive of considerable changes in the ways in which intuition came to be understood. Intuition was used frequently as a label for the rapid classification of stimuli when the grounds for classification are not explicit. The idea was that judgments made without awareness of the grounds are more "primitive" or developmentally earlier. The contrast is the slower, more deliberate form of judgment displayed by rational (male) adults. A set of studies by De Sanctis (1928) is one of the earliest efforts. De Sanctis tested the hypothesis that certain kinds of judgments, especially what he termed "nonsocial" judgments, involving, for example, estimates of size or number, would be more rapid and accurate in children and in the mentally retarded than in normal adults. These rapid judgments were called "intuitive." Yet results from the experiments are considered inconclusive, because the number of subjects was very small (one to two in some groups) (Westcott, 1968).

What is most interesting about the De Sanctis paper, in any case, is that the rationale for predicting greater accuracy of rapid judgments in children and the mentally handicapped is based on the view of intuition as a "primitive" and irrational function. The rapid discrimination required for

the experimental tasks is not entirely out of keeping with the tradition of sensory intuition, for example, with the kinds of functions identified by Locke in connection with intuition (i.e., the mind perceives relationships such as "white is not black" or "a circle is not a triangle . . . as the eye doth light" – without close examination or proof) (Locke, 1964, *Essay*, IV, I, 2). Yet the construction of this ability as primitive and irrational and the prediction of its superiority in children and the handicapped suggest a departure from its historical association with the highest exercise of rational powers.

Similarly, Valentine (1929) compared women's judgments of schoolchildren's character to judgments made by men, providing a test, as she saw it, of the by now prominent folk assumption that women are more intuitive than are men. The description of intuition used for the study is as follows: "I shall use intuition as implying judgments of which the grounds are unconscious without limiting them to either innate or experiential bases" (p. 215). The hypothesis was not supported; there were no sex differences in the fit of judgments made by study participants with criterion judgments made by the children's teachers.

Jung (1923) included intuition in his typology of four "mental functions" (sensing, feeling, thinking, and intuiting) that are variably ascendant between persons and which, with two types of general orienting attitude (extraversion and introversion), combine to determine an individual's characteristic behavior pattern or "type." Intuition for Jung is an "irrational" mental function, in the sense that it involves no judgments, but rather serves to perceive the possibilities and implications of any event as these are revealed, particularly in the collective unconscious, the deepest layer of the unconscious that is shared universally, an endless reservoir of instinctual and cultural representations. In addition to the profound importance of the analytic tradition inaugurated by the model of psyche Jung proposed, intuition's place in personality assessment was established with the development and wide-ranging application of the Myers-Briggs Type Indicator for counseling, placement, and other purposes.

McDougall (1923) briefly discussed intuition in a section of *An Outline of Psychology* titled "Apperception," defining it as "the discerning of essential similarities between objects which we have learned to discriminate and distinguish from one another" (p. 386). This definition reflects ideas on form perception developed in Gestalt psychology (e.g., Köhler, 1925). McDougall calls intuition "implicit apperception" by way of comparing it with the "explicit apperception" that is associated with the "higher" mental functions such as language use and "forming abstract ideas" (p. 389).

Intuition, in contrast, "works . . . on a lower plane of intellectuality." He equates it particularly with "impressions . . . of a certain indefinable quality" experienced, for example, when meeting a stranger, explained in terms of a subtle likeness to others that cannot be openly identified (p. 391).

The characterization in psychology of intuition as a lower or more "primitive" mental process – the assertion of contrast between intuition and the mental operations responsible for reasoning – diverges radically from the framework in which intuition developed philosophically. In part because of its association with rapid, unchecked, even impulsive judgment in psychology, when intuition is mentioned in psychological contexts, it is frequently in disparaging ways. Although Jung provides a notable exception to this trend by binding intuition to creativity, the trend of degrading the reliability and accuracy of intuition as a basis for judgment is strongly represented with some influential examples in psychology. Paul Meehl (1954) famously compared the powers of "clinical intuition" (equating this with any judgment unaided by replicable formula) to actuarial prediction, offering empirical data to demonstrate the predictive superiority of the latter, which added to the case for excluding intuition from the set of worthy topics. Later, the inferior functioning of intuition in judgment and decision tasks was exemplified in the studies of Kahneman, Tversky, and colleagues, which demonstrate the bias and error introduced by the use of "intuitive," non-deliberative judgment (e.g., Kahneman & Tversky, 2000; Tversky & Kahneman, 1981, 1982).

An alternative trend in psychology presents intuition or intuitive activity as something that enhances survival and facilitates adaptation. Starting in the early 1940s, Egon Brunswik began to call "intuitive" the process by which organisms make inferences about features of the environment (e.g., as safe, or dangerous, or offering a food source) without awareness of the process (Brunswik, 1943, 1955). Of interest for our purposes is that Brunswik defines intuition in terms of *inference* or inferential processes – the very contrast class for intuition in important philosophical sources (e.g., Descartes, 1994). Brunswik construed the inferential process as probabilistic in nature. It is statistical inference, entailing implicit probability estimates; hence, the organism functions as an "intuitive statistician." Intuition relates to emotion but not in a general, diffuse way: intuitive processes, though unconscious, contrast with the relaxed, uncritical attitude and are instead equated with a kind of "betting" mood. Both Leary (1987) and Gigerenzer (1991) have commented that Brunswik's "intuitive statistician" was an analogy poorly understood and underappreciated by Brunswik's contemporaries. In recent decades, Gigerenzer has actively promoted renewed appreciation for