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Character, Virtue, and Science

Linking Psychological and Philosophical Views

In the past century, both philosophy and psychology have reawakened to virtue, but mostly independently. How can the disciplines integrate their approaches to virtue scholarship? We examine three key assertions from virtue ethics in light of empirical research in psychology: (1) that virtue is realized in habits and dispositions, (2) that virtue is realized by a mean between extremes (doctrine of the mean), and (3) that virtue relates to human flourishing and the *telos*. We discuss selected contemporary psychological programs – structural examinations of personality, expertise, and developmental studies – and consider their strengths and limitations in light of philosophical concerns and as they relate to virtue generally and specifically in science. We finish by suggesting areas for future fruitful inquiry at the intersection of virtue ethics and psychology.

1. Introduction

With increasing attention to virtue in psychology and the relevance of psychological theory and research to virtue ethics in philosophy (e. g., Annas et al 2016; Miller et al. 2015; Timpe and Boyd 2014; Peterson et al. 2017), we examine psychological research in light of philosophical conceptions of virtue. In doing so, we intend to highlight relevant research for philosophical consideration in the hope of providing some pathways into empirical studies for philosophers. At the same time, we hope that this entices psychologists to integrate philosophical concepts more explicitly into their work. Finally, we emphasize the implications of this work for understanding virtue in science.

Traditional societies have always been concerned with raising virtuous community members (Deloria 2006). Western education historically integrated religiously-based character development into lessons (e.g., McGuffey's Readers), even at the university level. But with increasing diversity of religious backgrounds, religiously-guided character education diminished in public schooling (Arthur 2014). Noting a decline in morality across US society in the mid-20th century, moral education scholars

began to advocate character education, making recommendations inspired by religious and ancient Greek notions of virtuous character (e.g., Ryan and Lickona 1987; Lickona 1983; Wynne and Ryan 1993). However, these philosophical models are not well applied in practice. For example, instead of promoting an ethic of virtue, most character educational programs have been rooted in deontological or utilitarian assumptions and goals¹:

In most accounts of character education, one cultivates virtues mostly to better fulfill one's obligation and duty (the ethics of requirement) or to prevent the rising tide of youth disorder (character utilitarianism, or the ethics of consequences). Although one can conceive of virtues as providing action-guiding prescriptions just as deontological theory does (Hursthouse 2003), the point of virtues in most accounts of character education is to live up to the prescriptions derived from deontic considerations: to respect persons, fulfill one's duty to the self and to others, and submit to the natural law (Lapsley and Narvaez 2006, 257).

What is called character education actually then typically focuses on an ethics of requirement (e.g., should Heinz steal the drug?) or an ethics of consequences (e.g., will more people benefit from x or y?), and not on an ethics of virtue.

In Western psychological studies of character, early empirical studies searched for cross-situational consistency in moral character in children, which was presumed necessary for demonstrating good character. But they had difficulty finding it, driving the whole enterprise underground (Hartshorne and May 1928, 1929, 1930). With the importation of neo-Piagetianism by Lawrence Kohlberg in the mid-20th century, deontological approaches dominated moral psychological research for the rest of the century (Kohlberg 1981, 1984; Lapsley 2006)². These approaches focused primarily

1 From Lapsley and Narvaez 2006, 257: "G. Watson (1990) suggested a useful tripartite division of ethical theory: the ethic of requirement (where the primary moral considerations concern rational judgments of obligation and duty and the moral appraisal of action), the ethic of consequences (various forms of utilitarianism), and the ethic of virtue. An ethics of virtue is distinguished from the others by its claim that the basic moral facts are facts about the quality of character (*arête*); that judgments about agents and their traits have explanatory primacy over judgments about duty, obligation, and utility; and that deontic judgments about obligation and action appraisal are, in fact, derived from the appraisal of character and ancillary to it. 'On an ethics of virtue,' he writes, 'how it is best or right or proper to conduct oneself is explained in terms of how it is best for a human being to be' (p. 451)."

Hence, a virtue ethics has two features: (1) It makes a claim of explanatory primacy for aretaic judgments about character, agents, and what is required for flourishing; and (2) it includes a theory about 'how it is best or right or proper to conduct oneself' in light of what is known about human excellence."

2 Erikson describes the resolution of each of the stages in his life-span theory as entailing virtue; however, this is a largely unexplored area of his work (though his theory is

on the individual's preferred way of making moral judgments in response to moral dilemmas, empirically measuring the developmental progress of moral reasoning. The flaws in a focus on reason alone became apparent when empirical linkages between reasoning and action were found to be weak (Lapsley 2006; Koenigs et al. 2007). Other scholars began to suggest additional factors critical for moral behavior, such as self-identity (Blasi 1980) – i. e., in order to take what is judged to be the moral action, one must be morally motivated – morality must be a central concern to the self.

The scope of moral functioning expanded further. Comprehensive approaches to educating moral behavior emphasized the importance of a host of psychological components and subcomponents beyond moral reasoning capacities alone, such as ethical sensitivity, ethical motivation (including self-identity), and implementation capacities (Rest 1983; Narvaez and Rest 1995). As with early studies of moral development, holistic approaches to moral character were centered around character formation in schools. One such holistic approach integrates self-authorship and ethical skills (sensitivity, judgment, focus, action) within a context of guided mentoring, community support, and positive climate, all addressing the question “Who should I be(come)?” (e. g., Narvaez et al. 2004). Although programs such as these did not use the term ‘virtue,’ in effect they were oriented to its development.

Recently, the broader field of psychology, outside of education, has shown an interest in studying virtue *per se* (e. g., Frimer and Walker 2009; Damon and Colby 2015; Reimer et al. 2012; Monroe 2001), especially with the rise of positive psychology (e. g., Peterson and Seligman 2004). Theoretical psychologists have begun to develop frameworks to support more robust empirical and theoretical models of virtue in psychology (Fowers 2012; Narvaez 2014, 2016; Nelson and Slife 2017). Nevertheless, conceptions of virtue in psychology vary considerably.

In light of Aristotelian concepts of virtue, this paper reviews psychological research, most of which does not explicitly aim to be about virtue. Even when this research seeks to directly examine virtue and character, it does so in a general and incomplete way, making theoretical connections to philosophical concepts challenging. We primarily sample from theories, studies, and programs of research that speak to virtue in practice if not by name. We provide empirically-derived explanations and terminology to bridge the divide between psychology and philosophy, drawing mostly from personality, educational, and developmental psychology. We also seek to apply

foundational for research on generativity and purpose, as we will discuss later) (Erikson 1961, 1968).

the insights gained to the nature of a virtuous scientist. How does or could psychology shed light on the nature of a virtuous scientist in light of philosophical categories?

2. Comparing Aristotelian Virtue Concepts with Psychological Research and Theory

In Western philosophy, most discussions of virtue begin with Aristotle's *Nicomachean Ethics* (Anscombe 1958) or Aquinas' *Summa Theologiae* (MacIntyre 1981). Although lists of virtues are often prescribed, we focus on an Aristotelian perspective on the basic features of virtuous character, which typically includes one or more of the following: (1) habitual disposition, (2) acting according to the golden mean, and (3) aiming for the *telos* or flourishing of human beings. We discuss these briefly and relate them to psychological constructs as well as to virtue in science, and then present a more in-depth discussion of a particular psychological program of study that provides productive empirical findings relevant to virtue, especially in science. We close our presentation of psychological work with an integrative section, drawing heavily on work in developmental psychology, elucidating some of the psychological roots of virtue formation.

a) Personal Continuity

Dispositional Habits. Aristotle's notion of habits and habituation refers to learning by doing with regular and consistent practice under the guidance of a virtuous mentor (Steutel and Spiecker 2004; Narvaez and Lapsley 2005). When virtue is described as dispositional, it refers to a set of sensibilities and capacities (perceptions, orientation, attitudes, feelings, thinking, motivation, action) that become 'natural' with practice and essential to oneself (Roberts 2017; Titus 2017). Virtue is not effortful but becomes spontaneous (Slingerland 2015). One must be well-mentored to develop in a virtuous rather than a vicious direction, and one's character is co-constructed by the community from the very beginning (*Nicomachean Ethics*; Narvaez 2014). Virtuous individuals have developed ways of perceiving, feeling, thinking, choosing, and acting that lead them to be more likely to contribute to the wellbeing of the community (Norton 1991). Mentored practice leads to settled dispositions to behave in particular ways on a routine basis without reflective choice, deliberation, or planning (Steutel and Spiecker 2004). This description aligns with contemporary cognitive science, including the requirement

of automaticity or spontaneous action (Narvaez and Lapsley 2004; Varela 1999).

Although virtue theorists often use the term ‘habits’ to describe virtuous dispositions, many psychologists cringe at the term. Psychologists historically have conducted extensive research on habits, particularly with animals, and in the field the term can be problematic because of its association with a discredited psychological theory, behaviorism, which implies a Cartesian-mechanistic worldview of passive subjects shaped by external forces or guided by disembodied minds. In this view, habits are sets of knee-jerk conditioned responses that ignore individual initiative in constructing a response. Yet, according to cognitive science, ‘dispositions to act’ are based on schemas (generalized knowledge structures that combine emotion, cognition and action) developed from patterns of experience (Lapsley and Narvaez 2006). However, more accurately, and corresponding to ancient descriptions of virtuous behavior (Yearley 1990), humans are “thoroughly embodied and embedded, actively and directly engaged in practical, pre-reflective commerce with the world” (Narvaez and Witherington 2018).

Aristotelian *habitus* conforms to views in philosophy that describe virtue as skill development (Annas 2011), to views in educational and developmental psychology referring to the development of expertise formed through extensive skill development (Ericsson and Charness 1994; Hatano and Inagaki 1986), and to dynamic moral psychological theory as mentioned earlier (Narvaez and Lapsley 2005; Narvaez and Bock 2014). We discuss the notion of *skill* below when addressing expertise.

In contemporary empirical research, individual behavior is often understood in terms of ‘traits.’ The two dominant subfields committed to understanding individual behavior – personality psychology, emphasizing the study of individuals and variation among them, and social psychology, emphasizing the role of context in psychological functioning – typically define traits as a person’s generalized tendencies to behave consistently across situations (e.g., Costa and McCrae 1992). However, traits are typically measured at the population or group level, comparing group means to make generalizations (nomothetic approach), and studies do not focus on variation among individuals (respecting the uniqueness of each individual – the ideographic approach). The nomothetic approach is too general to predict any individual’s particular pattern of behavior with regularity. Moreover, the notion of traits misleads in that individuals do not carry traits from situation to situation, as they would, for example, blue eyes. Thus, the term ‘trait,’ like the term ‘habit,’ is also insufficient for describing virtue. Instead, and more aligned with virtue theory, dispositions shift by situation in a

person-by-context interaction, leading to variability across contexts but also consistency within contexts and within persons (Lapsley and Narvaez 2005, 2006). Further, trait theorists' examination of dispositions typically is not tied directly to considerations of virtue (although see Fleeson and Jayawickreme 2015 for a new approach).

Whereas social scientific research on virtue and character has its roots largely in education, Sigmund Freud is credited with the initiation of a personality research program in which he intertwined morality with his tripartite division of the psyche (note that his theory is thoroughly discredited among social scientists today). In contrast, personality theorists like Gordon Allport attempted to extricate personality psychology from concern with moral evaluation (Allport 1927). Today when virtue is mentioned by personality researchers, it is often thinly defined (see especially Peterson and Seligman 2004, and critiques by Peterson et al. 2010; Van Slyke et al. 2012; Miller 2013; Roberts 2017; Kinghorn 2017; Titus 2017; Nelson and Slife 2017). Notably, Aristotle himself acknowledged that "most of these [virtuous] states also have no names, but we must try, as in other cases, to invent names ourselves" (*Nicomachean Ethics* 1108a). To be sure, it is an impediment to empirical study that many states of character have no names. Nonetheless, several researchers have addressed moral and spiritual dispositions broadly, such as moral identity (Frimer and Walker 2009), moral expertise (Narvaez and Lapsley 2005), spiritual identity (Schnitker et al. 2017), and moral chronicity (Narvaez et al. 2006). These research programs indicate that some dispositions relate to moral or spiritual functioning, especially in the case of individuals who conceive of themselves and the world in moral or spiritual terms. What is needed, then, is a closer examination of historically prominent conceptions of habits, traits, and personality in psychology in order to differentiate them when considering virtue.

Dispositions in science can be studied empirically. In our work, we are utilizing conceptions of virtues from Aquinas (Aquinas 1991) and contemporary virtue epistemology (e.g., Baehr 2011), contrasting laboratory scientists with ensemble musicians on their ratings of ideal and actual dispositions in their discipline (Reilly and Narvaez, in preparation). However, more complex notions of virtues must be adopted to advance our understanding of virtue in science, drawing on qualitative approaches including interview and ethnography.

Psychological Structural Models of Personality. Complex theoretical models of personality attempt to address multiple levels of behavior and to avoid the pitfalls mentioned above (i.e., the limitations of the concepts of habit and

trait). One structural approach to personality proposes three ‘levels’ of personality structure, based on existing lines of research: traits, characteristic adaptations (e. g., goals), and narratives (e. g., life stories) (McAdams 1996). As noted above, *trait* disposition research (e. g., Big Five theory; Costa and McCrae 1992) aggregates group data to look for recurring patterns of general dispositions across individuals, making the assumption that individuals’ patterns of behavior are similar across a variety of situations. The limitations of a trait approach are addressed in McAdams’ theory by two additional loci of personality. *Characteristic adaptations* are an individual’s typical way of being in the contexts in which they find themselves. They are expressions of dispositions within particular situations or circumstances, and may become more complex over time (McAdams 2013). Conforming to the person-by-context individual signatures mentioned earlier, such adaptations encompass both reactive responses to the situations a person encounters (e. g., the manner of responding to criticism from a family member) and intentional engagements in the pursuit of particular ends (e. g., seeking to improve family relationships). Characteristic adaptations are often researched in the form of an individual’s varied goals, strivings, and projects (Emmons 1999; Little 1993). Finally, individuals construct *narratives* and *identities* to integrate characteristic adaptations into a coherent story, structuring an identity and sense of continuity over time. Thus one can think of an individual’s characteristic adaptations as a complex system, and narratives as attempts to describe and justify that system.

One type of relevant characteristic adaptation studied empirically is *purpose* – a goal that is personally meaningful but also of consequence to the world beyond the self (Damon et al. 2003). An individual’s purpose can serve to organize narratives, guide selection of subordinate goals, and channel expression of traits (Malin et al. 2014). Another area important to our reconceptualization of virtue in psychology is the notion of *identity*. In narrative and identity research, *moral* identity refers to placing morality as central to the self (Frimer and Walker 2009; Narvaez and Lapsley 2009). Moral self and identity are shaped during the course of development (Kochanska et al. 2010; Reimer et al. 2009). Moral identity correlates with behaviors such as civic involvement, volunteering, and more productive behavior in the workplace (Cohen and Panter 2015). Emmons provides evidence of relationship between spiritual identity, meaning, and life satisfaction (Emmons 1999). Identity also encompasses redemption narratives, stories of personal growth in the face of setbacks or losses (McAdams and Guo 2015). These narratives are associated with individuals’ involvement in generative activities, such as volunteering and other contributions to

one's community, especially towards children, supporting the thriving of future generations.

Prior to the formation of traits, characteristic adaptations, and narratives, *temperament* is a term used to describe differences among children that emerge at a very early age (based on interactions between early life experience and biology) in facets of behavior such as emotionality, sociability, activity level, and self-regulation, and that can remain relatively stable across the life span (Buss and Plomin 1984; Rothbart 2007; Shiner et al. 2012; Shiner and DeYoung 2013; Josefsson et al. 2013). Temperament may be setting the stage for a given individual's expression of virtuous behavior, in alignment with theories describing the interplay of traits, characteristic adaptations, contexts, and well-being, components conducive to flourishing given one's life circumstances and the needs present in one's community (e. g., Emmons 1999; McGregor and Little 1998; Little 2008).

Imagine, for instance, Carrie, a woman whose self-perceived purpose is to promote sustainable energy through science. She tells stories about her childhood when she felt moved by the plight of newly hatched turtles crossing a busy road (temperament) and how this spurred her on to become concerned about the environment, hearing from environmentalists about their work (narrative), and so to come to think of herself as an environmentalist (identity). She forms relationships with those in energy research, educates herself on environmental issues, and also seeks work, relationships, and leisure activities conducive to her effective long-term pursuit of a career in sustainable energy (characteristic adaptations). These goals require frequent social interaction and stimulation, which suit her tendency toward extroversion (trait).

If we desire to understand the virtuous scientist, cases like Carrie's may be a starting place for both psychologists and philosophers. Scholars can consider the entire personality system, the individual, her history, and her context. This means, first of all, that it is not virtuous for everyone to become a scientist rather than to pursue other potential purposes and identities available to them. Nonetheless, for those who do choose to become scientists, this identity should contain a moral (and perhaps spiritual) dimension, connect with the broader narrative of their lives, and be expressed through virtuous characteristic adaptations. This is only a partial picture, and one we will expand on in later sections of the paper.

b) Excellence

Doctrine of the Mean. Virtue *in situ* operates on a continuum, with virtue representing situational balance in the center, and cacostatic responses – too

much or too little – representative of viciousness at both ends (Narvaez 2014; Roberts 2017; Titus 2017). According to Aristotle, virtue lies in the mean between excess and defect of passions, appetites, and actions: “To feel them at the right times, with reference to the right objects, toward the right people, with the right motive, and in the right ways, is what is both intermediate and best, and that is characteristic of virtue” (*Nicomachean Ethics* 1106b). This is referred to as the *doctrine of the mean*, sometimes called the golden mean. Perceptions, feelings, thoughts, motives, or actions relevant to the specific goals of a given virtue take place in the middle of the continuum, avoiding vicious extremes, with consideration of one’s own qualities and present circumstances (Losin 1987). For instance, in displaying fortitude, an ability to act well in spite of risk, especially risk to oneself, an individual displays neither the vice of rashness nor that of cowardice. Rashness might emerge if an individual takes a risk in pursuit of an end not worthy of that risk. Cowardice, in contrast, occurs when an individual does not take a risk that is worth taking.

Psychology generally has been more attuned to the cacostatic polarities of the behavioral continuum rather than to the mean. For example, psychologists examine psychopathological dispositions such as externalizing (aggression toward others) or internalizing (aggression toward self), or the notions of undercontrol (impulsive) or overcontrol (self-inhibited) (Achenbach 1974; Asendorpf and Van Aken 1999). There is little focus on consistent excellence, except in expertise research (discussed below). Furthermore, the mean is conditioned on the *telos*, which is to say that the proper mean in any given situation, community, or individual life is that which is most conducive to the flourishing of the community (more on this below in the section on *telos*). Thus, while we acknowledge the doctrine of the mean as an important facet of Aristotle’s virtue ethics, we emphasize that it has important theoretical and empirical limitations, as it is not independently amenable to psychological measurement, and, moreover, some actions and passions have no broadly accepted or easily discernible mean (Lapsley and Narvaez 2006).

The doctrine of the mean extends to an individual’s choices, not just reactions. Those pursuing the mean are, ideally, moving toward better and better choices and coming closer and closer to excellence. For example, if our scientist, Carrie, haphazardly and routinely puts herself in harm’s way impulsively and mindlessly, for no greater purpose, even if she responds well to those situations, it would be hard to attribute virtue to her. A multi-faceted personality structure perspective, like that presented above, allows us to consider the particularities of the individual and her circumstances, not just

the ideal for the immediate situation. This includes individuals' agency in choosing which goals to pursue in the first place and their work to shape the situations in which they find themselves (see also Sternberg 2003). The ideal end of a human life is its *telos* (see below for more), but individuals must orient themselves to this through pursuit of the mean. Thus, the doctrine of the mean extends to choices that affect individuals' life narratives and adaptations, such as whether a student chooses to attend medical school or to commit to a year of voluntary service, and the social and personal consequences of these decisions. Indeed, the virtuous person would be expert in ethical self-authorship and self-direction, rather than only an expert in a particular domain (for a similar claim from a philosophical perspective see MacIntyre 2016). This is to say that the virtuous are capable, when necessary, through normative reflection and deliberation, of determining the mean, directing themselves toward the mean, and pursuing excellence well.

Aristotle's main point about the mean is not moderation, as most assume, but excellence in flexible response to varying situations (Kupperman 1999). "The virtuous person does not follow habits or rules inflexibly but adapts conduct to particular circumstances" (Lapsley and Narvaez 2006). A virtuous person adopts an orientation of openness, connection, and compassion, responding to the unique dynamics of a situation agilely, unencumbered by rigid rules or scripts; this is a signal of good health (Koutstaal 2013). Such an orientation can be facilitated by supportive developmental contexts, which promote excellence neurobiologically, socially, and morally (Narvaez 2014). Aristotle's notion of flexible response in behavior aligns with studies of adaptive expertise.

Nonetheless, different sets of skills may be most relevant to certain processes within the practice of science. When scientists are seeking evidence regarding a hypothesis, uniformity (e.g., an exacting and precise method for collecting data) is often emphasized over individualized and varied methods. As a result, in conducting experiments there is a certain intentional inflexibility. The experimental scientist controls for individual differences and attempts to control all aspects of a situation other than the variable to be manipulated (uniformity of task and situation). Flexibility occurs outside the experimental situation, in the study design and interpretation of results (especially surprising results), and the generation of new hypotheses.

Expertise. Moral psychology typically examines special cases of decision making (e.g., trolley problems, the Heinz dilemma, eating dog)³ instead of

3 Trolley problems refer to a class of dilemma in which the choice is between allowing a

real-life situations. The decision cases used in research represent *veridical* decision making: that is, parameters and ‘right’ answers are preselected by the experimenter (“here is a case – what would you do?”). Brain-damaged patients reason quite well with such circumscribed cases, making it hard to distinguish them from ‘normals’ (Goldberg 2002). However, the form of decision-making required in virtuous action is not veridical but more like what Goldberg calls *adaptive*. Adaptive decision making occurs in the flow of life events where one must pick out what is critical information (rather than it being pre-selected by the experimenter, as in the dilemma studies mentioned above). Prefrontally-damaged patients fail at this type of task. The individual must make sense of an array of complex stimuli in real time. From an information-processing perspective, this requires “sorting and prioritizing inputs, weighing possible actions and effects, checking intuitions and reasoning, and a multitude of other functions that lead to successful action” (Narvaez 2010, 171). Experts display these capacities to a greater extent than novices. Experts operate in the ‘sweet spot,’ the golden mean, of action. Virtuous persons have such skills too, but these skills are enhanced by attention to the ongoing and changing dynamics of a situation, bringing emotional presence and engagement with others to each situation, mindfully acting in a way that promotes the flourishing of all. Thus, adaptiveness is part of virtuous behavior, but virtue entails ethical factors cognitive scientists typically ignore.

Veridical and adaptive decision-making could be said to mirror different types of expertise. Routine expertise reflects veridical expertise or technical competence, the ability to solve familiar, well-structured problems in the domain. Adaptive expertise displays more flexible capacities – the ability to work with a dynamic fluctuation and capacities to create new methods of problem solving (Hatano and Inagaki 1986).

Within psychology, expertise means mastery of a domain, involving much more than intellect or narrow craftsmanship. It is a ‘knowhow’ comprised of integrated sets of knowledge: declarative (what), procedural (how), and conditional (when and how much). Experts have more and better organized knowledge that they apply in the right way at the right time (Hogarth 2001). They are motivated for excellence in what they do. Experts perceive the world differently, noticing details and opportunities missed by novices,

trolley to strike a number of people or, through personal behavior, causing a trolley to hit someone else (Foot 1967); the Heinz dilemma is Kohlberg’s most famous dilemma – should Heinz steal the drug that could save the life of his wife (Kohlberg 1981); Jonathan Haidt used graphic and unusual dilemmas to test gut reactions such as whether it is permissible to eat your dog if it is killed by a hit and run driver (Haidt et al. 1993).

and acting with greater perceived affordances (action possibilities). Experts often act spontaneously with automatic and effortless behavior, unlike novices who must consciously follow rules step by step (Dreyfus and Dreyfus 1990). The expert behaves in the right sort of way for the situation, accessing considerable tacit knowledge (Ericsson et al. 2006). In addition, they have ‘negative expertise’ – they attend to intuitions that signal uncertainty (Hogarth 2001), and are aware of what actions *not* to take in solving a problem (Minsky 1997). All of this is dependent on learning from extensive embodied practice (Varela 1999).

The notion of expertise has been applied to virtue development, such as “everyday ethical coping” (Dreyfus and Dreyfus 1990), in schooling (Narvaez 2006), and across the lifespan (Narvaez 2011, 2012, 2014). The expertise framework allows a breakdown of ethical skills that a virtuous agent would need to have. Using an information-processing framework, everyday *ethical* expertise involves at least four processes (Narvaez and Rest 1995; Rest 1983; Rest and Narvaez 1994):

Experts in *ethical sensitivity* are better, for example, at quickly and accurately reading a moral situation, taking the perspectives of others, and determining what role they might play. Experts in *ethical judgment* solve complex moral problems by reasoning about, for example, codes, duty, and consequences for a particular situation. Experts in *ethical focus* revere life and deepen commitment. Experts in *ethical action* know how to keep their ‘eye on the prize’, enabling them to stay on task and take the necessary steps to get the ethical job done. Experts in a particular excellence have more and better organized knowledge about it, have highly tuned perceptual skills for it, have deep moral desire for it, and use at least some highly automatized, effortless responses (Narvaez 2010, 171).

Expertise is often analyzed according to particular capacities in this way. Notably, the virtuous person would display aspects of all these components in dynamic interplay from situation to situation (Narvaez and Lapsley 2005). Specific skills comprising each component can be identified, potentially expanding the list of virtues to be developed (Stichter 2018). In fact, virtue theory would require the four components to be co-developed, whereas deontological or consequential ethics would allow them to be developed independently, emphasizing especially ethical judgment and ethical action⁴. Further, the skill breakdown above leaves out practical wisdom, which a virtuous person would display in deciding when and how particular skills should be used, but expertise, including virtue, does include the desire for excellence and flourishing (Narvaez 2013, discussed below).

Ethical expertise in science is particularly demanding, given the difficult-to-predict nature of research and its consequences (Moran 2014). To

4 Thanks to Mark Graves for pointing this out.

consider the possible ethical consequences of one's discoveries, scientific ethical expertise requires not only adaptive expertise in a highly specialized domain and skill in working with collaborators and students under the pressures of finding funding for one's work, but an ethical imagination that keeps one's actions and creations within the bounds of ethical research practice. Discussing conceptions of virtue as skill, Matt Stichter points out that ethical expertise in real-life situations is intertwined with power issues (Stichter 2018). No doubt this is true for science as well and should shape our understanding of flourishing in science. Returning to the model of personality developed earlier, ethical expertise in science is a necessary feature of the characteristic adaptations of a virtuous scientist, ordering their dispositions to accord with the doctrine of the mean⁵. But to what end? Virtuous action also requires the notion of *telos*.

c) The Highest Ends

Telos and Flourishing. The *telos* describes the proper end toward which an individual's efforts should be directed and typically refers to human flourishing, broadly construed – i. e., fostering the fullness or perfection of one's human nature and improving humanity as a whole (Aquinas, *S. Th.*; Aristotle, *Nicomachean Ethics*; Annas 1993; Titus 2017)⁶. An individual's *telos* is pursued through virtuous, rather than vicious, means. Thus, data fabrication, which is vicious in its dishonesty, cannot lead to the realization of the *telos*. Whereas a virtuous person has little difficulty avoiding actions that undermine flourishing, vicious individuals are more likely to struggle to engage in behavior conducive to flourishing, as a result of habits and dispositions directed toward other ends. The selection of virtuous means both reflects virtuous character and lubricates a virtuous disposition towards further refinement. In other words, individuals who cultivate virtuous perceptions,

5 It must be noted that it is virtually impossible to empirically investigate the virtue of an individual – that is, an individual's disposition to act in a manner that is virtuous, given a particular situation. There is no way to set up an experiment with controls and no way to understand the situation from the viewpoint of the actor without interfering with the action. Further, the claim or implied assertion that psychological science can evaluate virtue in a single setting or in thin-slice formats, rather than across time and situations, impoverishes and diminishes the concept of virtue. Thus, survey data need to be interpreted with caution. Ideally, a person is observed and understood across contexts, avoiding the fundamental attribution error (Ross 1977), a common error in Western societies that attributes the cause of a behavior to a stable personal characteristic rather than to the contingencies of a particular situation or context.

6 Flourishing is sometimes circumscribed by a particular community or *polis* (Annas 1993; Kinghorn 2017), or with regard to the divine (Titus 2017).

feelings, thoughts, and tendencies to act will develop virtuous habits and dispositions, though how they are to do so is often limited in specification, at least in ancient philosophical accounts from the West (Eastern accounts are another matter). We take up virtue development separately below, as psychology has much to offer in this realm.

The *telos* is not a typical focus of psychology, even as psychologists are increasingly interested in eudaimonic theories of well-being rather than individualistic and hedonic conceptions (see for instance Vittersø 2016). Nonetheless, these theories rely on approaches to *eudaimonia* that rarely extend beyond narrow prosocial concerns (encouraging better local social relations), and certainly do not capture the holistic and communal flourishing implicated in the *telos*. Concepts of the *telos* and flourishing are matters that involve value decisions, and contemporary psychologists generally tend to shy away from such discussions, with the exceptions of humanistic psychology – where meaning and self-transcendence, or the ‘terminal ends’ of values, have been a focus of discussion for over fifty years (e.g., Maslow 1943; Rogers 1951, 1961; Frank [1959] 1984) – and psychology of religion (e.g., Emmons 1999; King and Whitney 2015). Although Maslow focused on self-actualization of one’s unique potential as vital for flourishing societies, today most discussions focus on individual and subjective phenomena (e.g., “Does your life feel meaningful?”), rather than considering the flourishing of communities, the broader Aristotelian meaning of flourishing (Maslow 1971). Positive psychology, for instance, has advanced a variety of subjective framings for describing human flourishing and transcendence: self-transcendence (Wong 2016), happiness (Lyubomirsky et al. 2005), self-actualization (Maslow 1943), purpose (Bronk 2013), thriving (e.g., Bundick et al. 2010), and personal flourishing (e.g., Keyes 2007).

It must be underscored that in the view of Aristotle, virtue and flourishing come about through and for a supportive community (Norton 1991). No one flourishes alone. However, unlike the Aristotelian assumption of a community foundation, modern psychology, guided by Western enlightenment thinking, predominantly emphasizes individuals and their self-fulfillment. For the most part, psychology retains the focus on person-level flourishing, rather than on the social or communal flourishing which are essential to Aristotelian accounts of the virtues. In contrast, exemplar studies, which begin with those whose efforts are recognized as contributing to societal flourishing in some fashion, offer a promising avenue for research into telic concerns, often emphasizing the centrality of identity to the achievement of exemplarity, an exemplarity recognized by the community (e.g., Frimer and Walker 2009; Gardner et al. 2001; Damon and Colby 2015).

In the domain of science, given the power of scientific technology to affect not just local communities but the world, the scope of the community relevant to *telic* considerations is especially important. Considering only one community or generation and ignoring the effects of one's actions more broadly can have dire consequences. For example, corporate scientists have sometimes aimed for their company's flourishing at the expense of human health, as in the case of Thomas Midgley (Kitman 2000), who, knowing lead's abiding toxicity, nevertheless invented leaded gasoline, the dominant form of gasoline for many decades in the USA, which still has lingering effects in soils, the atmosphere, and waterways. In addition, even scientists intending to foster worldwide human flourishing take actions that in the end can cause harmful side effects, such as how the green revolution spearheaded by the work of agroscientist Norman Borlaug brought about increased crop yield but also, for example, decreased biodiversity of crops, increased economic inequality, and led to profligate use of pesticide and herbicides that has altered worldwide insect and bird populations (Mann 2018). These challenges bring to mind questions such as the following: Is it possible to think of the flourishing of all humans within one's scientific vocation? Does flourishing necessarily require a narrower conception of community? Should the flourishing of non-human entities (living or non-living) be included in conceptions of the *telos*?

Psychological Development and Virtue. Whether we are discussing personality structure, expertise, or exemplarity, development must have taken place. No one is born an expert. No one is born expressing adult virtue. Such capacities must be cultivated. Yet most scholarship in philosophy and psychology focuses on adult behavior, leaving the specifics of virtue *development* largely a mystery.

Virtuous behavior is difficult to find in the young because it takes life experience to develop the greater and better organized knowhow (practical wisdom) that experts demonstrate (Hursthouse 2003; Narvaez et al. 2010). Although Aristotle waved his hand towards the cultivation of virtue through the guidance of mentors and the gradual learning of dispositions and sensibilities, little detail was provided. On the other hand, Mencius was more precise about the development of virtue, emphasizing the importance of guided practice in learning specific capacities: attending to situations, extending feeling from old to new situations, and doing both with intelligent awareness (Varela 1999). Virtue is not about following habits or rules. Mencius describes the virtuous person as one who 'flows' from situation to situation with spontaneous wise action – without a 'self' to protect or be

concerned about, without deliberation about what is the right thing to do. For those in training, however, one must deliberately practice attention, extension, and mindful awareness. Deliberation or reflection comes into play in new situations when wise and compassionate spontaneous action is not yet forthcoming.

More recent empirical research demonstrates that temperament is initially fashioned in early life, even during gestation (Davis et al. 2007), but especially postnatally because of children's marked immaturity at birth and extensive postnatal development (Montagu 1986; Trevarthan 2011). Temperament is influenced by the nature of the parent-child relationship: for example, mutually responsive orientations promote agreeableness, conscientiousness, and cooperation (Kochanska 2002). Moral temperament is also seeded at this time as bracing self-protection or open relational attunement, rooted in neurobiological structures that underpin capacities for sociality (Narvaez 2014). Humans as social mammals inherit a nest of practices (soothing birth, extensive breastfeeding and affection, responsiveness to minimize distress, multiple responsive adult caregivers, free play, and extensive social support) that optimize biopsychosocial development (Narvaez 2016). When the nest is provided, structures that are scheduled to develop are supported (Narvaez 2014, 2015). In early life, these include both self-regulatory systems and tacit social capacities and motivation, capacities that are foundational to the development of virtue (Gleason and Narvaez 2014). Moral exemplars and generative adults, who take action to improve the world for future generations, often note their supportive childhoods (Oliner and Oliner 1988; Walker et al. 2010; McAdams and Guo 2015).

According to Narvaez, virtue is initiated 'bottom up,' from early life experience within a species-typical development system that shapes embodiment, including for virtue (Narvaez 2014, 2015, 2016). Embodiment refers to the fact that humans are biosocially constructed in early life from experience with caregivers and community members. Many neurobiological systems (e.g., endocrine systems, vagus nerve function, stress response) are foundational for self-regulation and social capacities. Neurobiological and implicit systems are socially constructed by immersed experience. A species-typical developmental system or nest⁷ shapes sensorimotor and procedural intelligences, the foundation for later characteristic adaptations and

7 Every animal has evolved a nest for its young that matches up with the maturational schedule of offspring, optimizing normal development (Gottlieb 2002; West-Eberhard 2003; Stotz and Narvaez 2019). Humans have a nest too, whose characteristics largely match up with those of social mammals who emerged over 30 million years ago (Konner 2005, 2010).

self-narratives, to be deeply socially-oriented. Social expertise develops in layers of capacities necessary for participation in a synchronous ‘flow’ of interpersonal action where the individual’s systems (neurobiological, implicit, and explicit) coordinate to maintain relational attunement and communal focus, expressing virtue in action.

In terms of the three aspects of virtue, childhood experiences shape neurobiological foundations for virtue and proto-virtue dispositions in measurable ways, with the evolved nest providing the natural context for this bottom-up development. A species-typical childhood shapes the neurobiological and implicit structures around a socially-oriented homeostasis (a socially-oriented golden mean), coupling sensorimotor knowhow with proto-virtuous, then virtuous, capacities. The evolved nest, lasting for decades, provides the context for virtue development and flourishing within a community.

Virtue is difficult to develop in species-atypical environments. Individuals who do not receive all the facets of the evolved nest are characteristically less self-regulated, empathic, and cooperative (Kochanska et al. 2010; Narvaez, Gleason, et al. 2013; Narvaez, Wang, et al. 2013; Narvaez et al. 2016). All of this likely makes it more challenging for them to orient their lives to the *telos*. A species-atypical system leaves gaps in the foundations for virtue, necessitating a reliance on rules and scripts to navigate social life unless extensive healing interventions or similar experiences occur. For example, studies of immersion in L’Arche communities have noted, at least anecdotally, benefits for individuals who have grown up in challenging environments (Reimer 2013). It is not clear, however, how much post-childhood experiences can revamp neurobiological structures (e.g., stress response and vagal tone – both important for social functioning) to attain consistent, cross-situational virtuous responses.

Children spend a great deal of time in schooling. But it appears challenging to actually educate for the complexities of virtue in classroom settings. Lapsley and Narvaez note that it is difficult in practice to distinguish character education from cognitive developmental moral education (e.g., moral discussion) (Lapsley and Narvaez 2006; cf. Kohlberg 1984). For all the appeal to Aristotle and virtue, character education, as we noted in the introduction, practically embraces the ethics of requirement just like interventions based on Kohlberg’s moral stage theory. Both approaches emphasize obligation, duty, and universal principles, and measure success in terms of improved conduct. The focus for both is “deciding the good thing to do rather than the sort of person to become,” and “the fact that character education is so thoroughly deontological and utilitarian with so little in common

with virtue ethics is not inherently problematic, although it does attenuate some hope that virtue ethics would open up a new front in moral psychology and education” (Lapsley and Narvaez 2006, 257–58).

No matter the moral emphasis in the curriculum, students tend to advance more in some aspects of their development and less in others, across an array of pedagogies (see Seider et al. 2017). Schools often focus on one or two virtues (e. g., honesty, kindness) and can show increases in student scores on the outcome measures used. But this is not evidence of virtue as we have defined it. Skills for getting along with others certainly are building blocks towards virtue, but the development of full-blown virtue requires a more holistic approach that entails extensive mentoring from wise and responsive elders and virtuous models, coached guidance during immersed social experience, guided reflection, and extensive practice across situations (Narvaez et al. 2003)⁸.

Ethics education in science tends to focus on reasoning about dilemmas (e. g., Han and Jeong 2014), rarely addressing virtue development. Fostering virtue in science would necessitate a broader scope than deontological and utilitarian ethics. Although practice and honing of a broad set of domain-specific skills beyond reasoning are needed (e. g., perceptual and attention skills; sensitivity to domain issues and domain effects on society and the environment; action skills for all relevant situations plus their particularities), these must be deployed in the right way at the right time. Such learning requires extensive modeling and mentoring, as occurs in fields like surgery where mistakes are costly. Drawing on models from outside the field of moral education may help to guide revisions in science ethics education. For example, talent development emphasizes the importance of models in developing independent student projects focused on the common good (e. g., Renzulli et al. 2006). Expertise development highlights the value of deliberate focused practice (Ericsson and Charness 1994). Science education could benefit from consideration of alternative approaches to science, like those of Native science, where maintaining virtuous relations with the natural world is integral to doing science properly, and can only be learned with the guidance of wise elders (e. g., Cajete 2000; Medin and Bang 2014).

⁸ And we must recall that virtue in its full definition is not apparent in the young (Hursthouse 2003), including college students, and, moreover, high levels of psychosocial maturity are almost never reached before the age of 40 (Kegan 1982).

3. Implications and Future Directions for Scholarship in Virtue and Science

Our contribution here to the scholarship of scientific virtue is threefold. First, we propose that virtuous scientists are disposed to engage in science as adaptive ethical experts who are living lives ordered to promoting the flourishing of communities, in part as a result of formation in developmental contexts that conduce to the flourishing of the scientist. What this adaptive expertise looks like can be examined by both psychologists and philosophers. Although ethical expertise research provides important insights into the development of capacities and the golden mean in practice, and could be considered a necessary component of a virtuous system of characteristic adaptations, it has yet to be tied clearly to flourishing. At the intersection of expertise and identity lies moral or ethical identity (e.g., Hamilton and LaVoi 2017; Nakamura et al. 2009). When ethical identity orients expertise, it concerns itself with human flourishing. But how does expertise contribute to the flourishing of a particular practice and the communities that practice serves? Initiating empirical research on scientific purpose, scientific moral identity, scientific spirituality, scientific generativity, and scientific transcendence, all of which consider individuals as transcending themselves in some way, could provide pathways to addressing this question. Still, philosophical guidance is needed – specifically, domain-specific descriptions of what human flourishing looks like in scientific contexts. And, because virtue is a communal affair, additional studies of morally exemplary scientific *communities* as well as their members would be beneficial (e.g., Nakamura et al. 2009).

Second, virtuous scientists should be thought of as self-authoring, which is to say that they reflect on and deliberate about their good, their vocational practice, and the good of the community in a way that leads to these goods. As Clarke, following Murdoch (Murdoch 2001), points out, much like a jazz musician puts a personal stamp on his music, so a virtuous person, who necessarily is guided by a personal inflection of moral terms and concepts, expresses virtue in a unique way (Clarke 2018). “The virtuous person is one who has linked his inner life to open, ordinary life” (47). It may also be productive to explore existing life span studies (like the Grant, Berkeley, and Terman longitudinal studies) to examine those who became virtuous scientists, and who may provide insight into a variety of individual pathways. A developmental focus is needed, as too often attention is drawn to scientific heroes on one end or scientific scoundrels on the other, to the neglect of the lifeways of ordinary scientists. A deeper engagement with virtue and virtue theory within personality psychology may be fruitful, in particular explicitly

examining life purpose as it relates to virtue theory. Vocational narratives, which have yet to be studied, serve to integrate personality, through orienting characteristic adaptations to the *telos*. Such narratives likely include life stories of generative lives, lives oriented to the good of future generations (McAdams 2015; McAdams and Guo 2015). Virtuous individuals are also engaged in the pursuit of one or more purposes oriented to the *telos* as central goals, with personal capacities and goals integrated into life pursuits. Thus research on purpose stands to enrich virtue theory. Virtue theorists are also likely to benefit from engagement with empirical studies of vocational stories and identities – that is, how individuals respond to the ‘call’ of their traditions and the narratives they construct through engagement with them.

Additionally, engagement with conceptions of virtue outside those in Aristotelian philosophy is worthy of attention, both psychologically and philosophically. For example, an Eastern philosophical definition is more explicitly demanding and requires additional description, which we do not have the space to engage in here. In brief, however, these conceptions tend to describe how a virtuous individual acts in each situation: wisely, compassionately, and selflessly (without ego, scripts, rules, or mindless habits) (Varela 1999). The goal is to be fully present in each situation without self-oriented goals. It remains to be seen whether this can be translated into a Western scientific context. Similarly, Native science is more holistic in its expectations of the scientist and more inclusive in its ethical concerns. Because of intellect’s tendency toward arrogance and ruthlessness, Native science is wary of letting it alone guide action; the heart must be the ultimate guide, and it must be well developed and well-tended (Cajete 2000). Humans live in an earth community and rely on its flourishing, so the Native scientist is always concerned with the wellbeing of the other-than-human, treating them with respect. In this way, Native conceptions of virtue and science are distinct from Aristotelian virtue, which focuses primarily on human interests and wellbeing (Narvaez 2014). This is especially important given the ecological impact of science and the challenges it presents, noted above.

Virtue scholars should also attend to how virtue develops, a topic which the developmental sciences can assist. Given the fact that most children in industrialized nations are raised outside of species-typical social systems, this makes virtue more difficult to achieve generally. As a result of species-atypical upbringings, many individuals develop their intellects out of synchrony with their emotional systems. Many of these children pursue higher degrees, including in science. It takes courage and extensive rehabilitation to reintegrate intellect and emotion, which many do not undertake. How do individuals without well-coordinated intellects and emotions in science

develop virtue? How can science education help students to integrate mind and heart in a holistic manner? Can we move Western science towards a more holistic, relational, and emotionally attuned perspective, like that of Native science? Doing so seems essential to fostering scientific virtue. In light of these varying conceptions of virtue, we encourage psychologists to adopt explicit normative frames for evaluating virtue, *emic* (those of participant populations) and *etic* (those emerging from theoretical perspectives), in general and in understanding virtue in science, rather than engaging in the fiction of performing strictly objective research.

Finally, our discussion of virtue has focused on three facets of virtue. It has not considered in depth classic virtue concepts such as justice, humility, courage, or prudence. Each of these certainly has manifestations in science and is worthy of further study. Justice, perhaps especially as it relates to truthfulness and honesty, has manifestations in each scientific role, for those who serve as teachers, mentors, advocates, collaborators, experimenters, writers, and more. In addition, the relation of justice to courage and prudence bears examination. These and other specific virtues require targeted research, especially to examine the consequences of varying conceptions of virtue and science (including conceptions which reject virtue ethics). All of this is essential to creating a more complete picture of the virtuous scientist.

4. Conclusion

In this paper, we have sought to engage constructively with scholarship at the intersection of psychological research and philosophical conceptions of virtue. We have described how psychological studies address the three facets of virtue (dispositions, golden mean, *telos*). McAdams' structural model of personality addresses both dispositions and the *telos*, but provides less insight into the golden mean (McAdams 1996). Research on adaptive and ethical expertise may be especially helpful in understanding the doctrine of the mean within dynamic situations. Existing empirical research provides less insight into *telic* concerns and human flourishing, even though these reside at the heart of virtue. Vocational identity studies may remedy this lack. Psychological research has the most room to advance in addressing the *telos*, ideally through greater engagement with philosophical conceptions of flourishing. We think that the philosophy of virtue can benefit from engaging the research we have reviewed. Each field could be richly informed and stimulated by the other. We encourage such work in exploring what it means to be a virtuous scientist.

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