Using Exemplars for Holistic Character Education: With Evidence about Embodiment and Learning from Neuroscience and Computer Science

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Abstract

In this chapter, I will discuss employing exemplars in moral and character education promoting virtue development with the involvement of embodiment. Virtue ethicists propose two phases of virtue development: early virtue habituation and later *phronesis* cultivation. I will overview prior research on the mechanism of habituation at the biological and neural levels to examine why embodiment is fundamental during the first phase, virtue habituation. Then, I will review recent philosophical and psychological studies about the nature of *phronesis*, i.e., practical wisdom, to consider how educational activities cultivate it. Based on these preliminary examinations of the course of virtue development, I will examine the previous literature about the role and importance of using exemplars in moral and character education involving concrete and interactive activities with the exemplars involving embodiment during the learning process. Finally, I will draw upon the Self-determination theory about supporting students' need for autonomy, competence, and relatedness to consider a way to improve the effectiveness of exemplar-applied education along with embodiment. After examining the relevant theoretical frameworks mentioned above, I will discuss several practical guidelines for using exemplars involving character embodiment for virtue development.

Keywords: virtue development; embodiment; habituation; phronesis; moral exemplar; Self-determination Theory

Introduction

Educators have regarded and employed moral exemplars for character education (Athanassoulis & Han, 2023; Henderson, 2024b; Kristjánsson, 2006a; Sanderse, 2012). They used the stories of exemplars to motivate students to emulate moral deeds done by the exemplars to promote character development. Empirical studies in social and educational psychology support the practical values of exemplars in motivating students (see Han & Graham [2024] for a review based on data syntheses). They also examine the psychological mechanisms underlying how exemplars motivate students to engage in moral behavior. For example, previous social psychological studies have demonstrated basic mechanisms about how exemplars promote motivation, such as modeling, elevation, and upward social comparison (Han et al., 2017, 2022; Lockwood & Kunda, 1997). Several follow-up studies in educational psychology and philosophy have suggested practical points to improve the effectiveness of exemplar interventions, such as employing relatable and imperfect-attainable exemplars (Athanassoulis, 2022; Croce & Silvia Vaccarezza, 2017; Han & Dawson, 2024).

In this chapter, I will discuss further implications of using exemplars in character education for holistic character development, which embraces the internalization of virtues and cultivation of *phronesis*, i.e., practical wisdom, required for flourishing (Han, 2024a; Sanderse, 2015, 2020). It will expand the previous discussions on the uses and values of exemplars in character education by focusing on the holistic aspect of character development and education. I intend to refer to evidence from neuroscience and computer science, particularly those addressing model-based learning, to support the usefulness of exemplars. It will provide empirical insights into why using exemplars with embodiment is

necessary for virtue development. The review of empirical evidence will begin with a brief discussion about why they can significantly inform our endeavor to examine the necessity and importance of using exemplars in moral and character education. I will overview research on the embodiment of morality and character to substantiate the point (Narvaez, 2010; Strejcek & Zhong, 2024). Additionally, I will briefly address how the conceptual framework of this chapter, i.e., virtue ethics constituting the basis for virtue habituation and *phronesis* cultivation, is associated with the point about character embodiment.

I will then propose the importance of exemplar-based learning in character education with the evidence mentioned above. Recent empirical research on the psychological mechanism of *phronesis* and virtue has documented that their functioning requires the involvement of multiple functional components and coordination and interaction among them described in the form of a network model (Darnell et al., 2019, 2022; Han, 2024c, 2024b). Such findings suggest that successfully promoting character could not be achieved via merely focusing on teaching individual functions and virtues but requires learning network-wise macroscopic skills to optimize functional coordination and cooperation. Empirical findings from human neuroscience and artificial intelligence research in computer science also support that model-based learning is necessary to develop generalizable high-level skills for optimal performance in various functional domains (Han, 2024d). These research outcomes coherently suggest the necessity of exemplars for model-based learning in character education and development.

Moreover, I will discuss several practical directions for exemplar-based character education. For holistic cultivation of *phronesis* and virtue, I will overview the Self-Determination Theory (SDT) to examine how the theory can contribute to exemplar-based

learning for flourishing (Curren & Ryan, 2020; Han & Graham, 2024). While discussing these additional practical points, I will refer to recent advances in philosophical and empirical research in the field to consider the infrastructure for the embodiment of character associated with the theoretical frameworks mentioned above about mechanisms primarily at the behavioral and psychological levels.

Virtue Ethics and Embodiment of Morality and Character

Research on the embodiment of morality and character suggests that we pay attention to their biological substrates to understand their dynamics and developmental processes (Churchland, 1998; Narvaez & Vaydich, 2008). According to previous works on the embodiment of morality, moral development occurs via the interaction (including physical interaction) between individuals and the environmental factors surrounding them (Narvaez, 2010; Strejcek & Zhong, 2024). Through the interactive process, individuals develop their moral functioning across different functional domains, such as cognition, affect, and motivation (Lerner, 2019; Turiel & Nucci, 2017). From the perspective of character embodiment, one interesting point about the process is that moral development and functioning involve engagements from and changes at the physical and biological levels (Han et al., 2019; Lahat, 2015). For instance, immediate and intuitive responses to morally problematic situations involve bodily reactions, such as moral disgust (Strejcek & Zhong, 2024), rooted in the history of human evolution. Once we consider individuals' moral and character development, we can discover that they are inseparable from the development of neural circuitries and networks playing fundamental roles in various cognitive processes from evidence in developmental neuroscience (Han et al., 2019; Immordino-Yang, 2011; Immordino-Yang et al., 2007).

Such a point about moral character embodiment, which also argues the necessity of studying human psychology and neuroscience (Han et al., 2019; Immordino-Yang et al., 2007), might be closely tied to the philosophical perspective of virtue ethics. Virtue ethicists are interested in how individuals' virtues and character traits develop to achieve their flourishing in the long term (Ardelt & Kingsbury, 2024; Narvaez, 2008; Stichter, 2024). Sanders (2015), a moral philosopher, proposed the theoretical model of moral development based on virtue ethics. According to his model, the habituation and internalization of virtues feature the earlier phase of virtue development. The habituation process involves exercising virtues via trials and activities (Sanderse, 2020). Then, once individuals' cognitive capacities develop over time, they enter the next phase of cultivating *phronesis*. *Phronesis* cultivation can occur through various activities, including deliberation and reflection (Kristjánsson, 2014). Kristjánsson (2012) argued that individuals can flourish when they complete virtue habituation followed by *phronesis* cultivation. According to his viewpoint, one may demonstrate a sufficient degree of moral functioning, such as moral judgment, even without virtue habituation; however, in such a case, one cannot happily implement moral action as virtues could not be one's natural part earlier in life, so one cannot achieve the goal of virtue development, eudaimonic well-being.

Of course, we should also consider the importance of *phronesis* cultivation, the next phase of virtue development, in enabling one to function optimally in moral domains and flourish in the long run (Ardelt & Kingsbury, 2024; Kristjánsson, 2022c). Although virtue habituation constitutes the basis for long-term flourishing, merely internalizing external input during the process does not ensure optimal moral development. That said, one needs to cultivate practical wisdom to render decisions while encountering complicated

situations involving conflicts between individual virtues (Kristjánsson et al., 2021). For instance, we can imagine when one's parent commits criminal behavior. In such a case, different individual virtues, such as love for family and honesty, conflict with each other, and the conflict may hinder appropriate moral decision-making. If one does not possess fully cultivated *phronesis*, one cannot resolve the issue of conflicting individual virtues and make the best decision. It would be difficult to say that one is perfectly virtuous and objectively flourishes in that situation, although one could habituate the individual virtues earlier in life. Hence, virtue ethicists argued that one should engage in *phronesis* cultivation after completing virtue habituation for optimal virtue development (Graziano, 2024; Kristjánsson, 2015, 2022c; Vaccarezza et al., 2023).

Such a developmental model proposed by virtue ethicists may support my point that character embodiment should be worth a serious examination to shed light on the mechanism of optimal moral functioning and character development. Based on this assumption, in the following part, I will discuss how virtue habituation as the first phase of virtue development proposed in virtue ethics closely connects with the concept of character embodiment with evidence from scientific studies on human cognition and morality.

Embodiment of Morality and Character, and Empirical Evidence

Virtue habituation occurs via repeated training and exercise of moral virtues so that they can become integrated into oneself and become one's integral parts (Sanderse, 2020). Consequently, one who successfully habituates moral virtues can implement such virtues in actual moral behaviors with pleasantness without experiencing severe pains or difficulties (Kristjánsson, 2006b, 2013). Moral philosophers further suggest that early habituation of

moral virtues is fundamental in long-term moral development, i.e., *phronesis* cultivation later, and finally, eudaimonic well-being (Sanderse, 2015). As mentioned above, although one may make appropriate moral judgments later in life, even if one could not complete virtue habituation earlier (e.g., one's childhood upbringing was vicious), virtue ethicists argue that one may not feasibly and fully flourish by doing moral behavior (Kristjánsson, 1998, 2013; Sanderse, 2020). Because virtues are not integral and natural parts of oneself, doing moral behavior, which may contradict self-interests, can produce uncomfortable emotions (Kristjánsson, 2022b). Such a morally continent person can render moral judgment and engage in moral behavior via effortful reasoning processes, so the case is deemed suboptimal compared to the case where one completed virtue habituation earlier in life and can naturally behave virtuously (Kristjánsson, 2012).

One point about virtue habituation that we need to consider within the context of examining the embodiment of morality and character is that if the habituation process is supposed to result in the automatized implementation of virtues like habits in general, then that is perhaps inseparable from the responsive biological-level processes involving habituation (Graybiel, 2008). Like the cases of intuitive responses in moral domains (e.g., moral disgust immediately elicited by external cues [Schnall et al., 2008]) firmly based on biological infrastructure, it would be plausible to assume that the biological processes related to habituation, such as neural networks and circuitries associated with intuitive responses to situations (Gera et al., 2023; Lieberman, 2000), also support a quick exercise of habituated virtues. If the brain networks and circuitries constituting the basis for quick motivational and behavioral responses do not engage in the processes of virtue habituation, the automatic reactions involving moral behavior mentioned above could not

occur in reality (Kristjánsson, 2022a). Instead, morally problematic situations may require even people with apparently habituated capacities for moral judgment to activate neural circuitries dealing with effortful cognitive processes (e.g., the neural network involving the anterior cingulate cortex and dorsolateral prefrontal cortex [Greene et al., 2004; Kim et al., 2010]). So, they cannot implement moral actions to respond to the situation quickly.

Findings from several neuroimaging studies support that general habituation is associated with and implemented by embodiment (Farina, 2021), particularly at the neural level and in terms of the interaction between practice and brain development (Han, 2016). Structural and functional neuroimaging studies, such as Gera et al. (2023) and Zwosta et al. (2018), reported that one's habit strength and habit formation were significantly associated with neural circuitries engaging in various cognitive capacities. Zwosta et al. (2018) further demonstrated that changing the habit strength via training positively affected the strength of the connectivity of the circuitries mentioned above. These studies may provide some evidence that habituation via training and exercise involves significant structural and functional changes in neural networks and circuitries associated with skills and capacities being habituated (Han, 2016).

Neuroscientists have found such a trend at the neural level while examining the internalization of sophisticated expertise involving higher cognitive capacities, which might be more relevant to virtue habituation compared with simple habit cases introduced above (Kristjánsson, 2006b; Slingerland, 2010). Good examples might be research on professional Baduk (Go) players. Lee et al. (2010) structural neuroimaging study comparing the neural circuitries associated with various cognitive processes between professional Baduk players versus non-professionals reported significant structural differences in brains across the

groups. Based on the neuroplasticity concept, they argued that continuous training that made professionals master game skills significantly altered brain circuitries associated with spatial processing and cognitive capacities, which are essential for advanced Baduk playing. Interestingly, the evidence suggested the weaker involvement of effortful and load-dependent cognitive processing among professional players than controls.

Moreover, Jung et al.'s (2013) structural MRI study reported that professional Baduk players demonstrated distinctive features in brain circuitries associated with intuitive, automatic, and habituated cognitive processing. In a follow-up study, Jung et al. (2018) demonstrated that expert Baduk players showed stronger brain networks for domain-general visual and spatial processing associated with intuitive strategy judgment through long-term training. Such findings are consistent with what I mentioned about the anticipated weak engagement of effortful cognitive processes in generating moral behavior resulting from virtue habituation (Colby & Damon, 1992). It may support the assumption that habituation will enable one to implement habituated expertise automatically so that effortful cognitive control becomes unnecessary in the process requiring habituated expertise like automatically implementing habituated virtues.

A point worth attention is that embodiment is central to this habituation process. As the concept of embodiment suggests, habituation and skill development cannot effectively occur exclusively by abstract or conceptual input (Shapiro & Stolz, 2019). Instead, as shown in the cases above, constant hands-on exercise and training involving concrete activities can change neural circuitries associated with cognitive skill sets of interest (Cantou et al., 2018). Such a point can apply to the domain of social-emotional learning, which is relevant to character education and virtue development (Snow & Beck, 2018).

According to Macrine and Fugate (2021), embodied learning based on embodied cognition can benefit teaching and learning for social-emotional skills. By participating in educational activities involving concrete activities, students can improve and internalize social-emotional skills more effectively by acquiring concrete knowledge and capacities for emotional regulation, perspective-taking, etc. (Cook & Murphy, 2023; Goh et al., 2022).

Although I overviewed neuroimaging studies that reported the significant neural-level influences of habituation, which supports the association between habituation and embodiment, only a few previous studies directly addressed virtue habituation or, at least, internalization of morality. Most prior neuroscience research on habituation focused on general psychological functioning, which is not specific to morality and virtues (Graybiel, 2008). The previous neuroscientific studies cited above were about simple behavioral habits (e.g., Gera et al. [2023] and Zwosta et al. [2018]) or habituating cognitive capacities for professional Baduk playing (e.g., Jung et al. [2013, 2018] and Lee et al. [2021]), which are not directly relevant to virtues and morality but more about general cognitive capacities.

Despite the lack of directly relevant previous research, previous studies addressing moral development at the neural level may provide some hints about how habituation and embodiment in moral domains occur. One relevant study in the field might be examining moral identity with neuroimaging (Zhu et al., 2024). Generally speaking, moral identity refers to the centrality of ethical values and virtues to one's self-identity (Aquino & Reed, 2002; Damon, 1984). Moral identity plays significant roles in moral functioning, such as filling the gap between judgment and behavior (Blasi, 1984; Hardy & Carlo, 2005). From the perspective of virtue ethics, moral identity constitutes the basis for one's blueprint to

live a virtuous and flourishing life (Darnell et al., 2019; Kristjánsson, 2021). Henderson (2023) proposed that the blueprint is fundamental in establishing the basis for one's virtuous goal at the beginning of virtue development. Given those accounts proposed by virtue ethicists, it would be possible to assume that moral identity as a blueprint for a virtuous life paves the way to internalizing virtues and flourishing in the long run. Additionally, Colby and Damon's (2002) qualitative study examining the common psychological strengths shared by moral exemplars, who continuously exercise moral virtues as a natural part of themselves, can also shed light on this topic. According to their study, virtuous exemplars possess a strong sense of moral identity formed via the cumulative process of internalizing moral values and virtues as the core of their identities and beliefs (Colby & Damon, 1992; Jeong & Han, 2013).

Hence, referring to neuroimaging studies focusing on moral identity development may provide at least indirect evidence relevant to the neural-level mechanism of virtue habituation in moral domains. Zhu et al. (2024) reported that the strength of moral identity was positively associated with connectivity in the precuneus, a part of the default mode network playing a fundamental role in self-related processes, including autobiographical memory processing, self-referencing, etc. (Buckner et al., 2008; Qin & Northoff, 2011; Stieger et al., 2024). According to moral identity research, autobiographical and self-referencing processes are central to moral identity formation because the formation occurs via accumulating one's beliefs and self-representations in moral domains during development (Hardy & Carlo, 2011). Furthermore, Pletti et al.'s (2019) experimental study examined how moral identity was associated with responses to situations involving moral dilemmas and problems at the neural level. Moral identity positively predicted the neural

activity component represented by the N2 amplitude in a brain wave in the brain regions in the midline in their study. One thing to note is that the N2 amplitude is related to quick automatic reactions to external input, which are inseparable from behavioral embodiment. The midline brain areas constitute the core component of the default mode network and significantly engage in socio-moral cognition and self-related processes (Han, 2017; Han et al., 2016; Reniers et al., 2012).

These neuroimaging studies support the connection between moral identity formation and the development of the neural circuitry addressing self-related processes (Pletti et al., 2019; Zhu et al., 2024). Consequently, it would be plausible to argue that forming a moral identity can be understood as the process of the internalization of ethical values and virtues at the neural level. Given what Pletti et al. (2019) reported, moral identity may contribute to the habituation of social cognitive capacities for enabling quick responses to ethical problems. Hence, at the least, the neuroscientific evidence indirectly supports my point that the embodiment associated at the neural level is supposed to implement the habituation of moral virtues occurring in the first phase of virtue development. The empirical examination of the neural mechanisms, networks, and circuitries engaging in the embodiment process in moral domains, like the moral identity studies mentioned above (e.g., Plett et al. [2019]), will provide researchers in virtue development and character education with insights into how to understand the process of virtue habituation better based on evidence.

Additionally, we may refer to several studies reporting the effects of interventions involving bodily activities for embodiment in moral domains. For example, Sevinc and Lazar (2019) proposed that mindfulness interventions may alter the neural circuitries

addressing moral functioning, such as those in the default mode network and the insula, a brain region dealing with interoceptive processes to detect and control bodily and physiological responses and motivational regulation (Han et al., 2016; Naqvi & Bechara, 2010). Previous neuroimaging research on morality has reported that these circuitries and areas are central to moral functioning and motivation (Bzdok et al., 2012; Han, 2017; Han et al., 2016; Sevinc & Spreng, 2014). Furthermore, Berryman et al.'s (2023) review paper introduced previous studies employing contemplative and mediation interventions to promote various moral functions. Although they did not address virtue habituation directly, these at least indirectly support my point that embodiment potentially plays a significant role in the habituation of virtues at the behavioral and neural levels.

In the following part, we will discuss the phase of virtue development next to virtue habituation proposed by moral philosophers, *phronesis* cultivation. As I overviewed in the introduction, although earlier habituation of virtues is vital for long-term eudaimonic well-being, we should also cultivate *phronesis* for optimal moral functioning and flourishing. Given the developmental importance of cultivating *phronesis*, it would be worth addressing *phronesis* cultivation and embodiment with scientific evidence to examine virtue development from biological perspectives on top of virtue habituation occurring earlier in life.

Phronesis Cultivation, Embodiment, and Scientific Evidence

As overviewed previously, virtue ethicists underscored the importance of cultivating *phronesis*, i.e., practical wisdom, to render the best decisions across situations during the second phase in virtue development (Sanderse, 2015). Habituating individual virtues per se earlier in life does not necessarily help one make optimal decisions in

complicated situations where different virtues conflict with each other. Thus, *phronesis* is essential in achieving eudaimonia in the long run (Kristjánsson et al., 2021). Given the complexity of the nature and mechanism of *phronesis*, *phronesis* cultivation may also involve embodiment, as I proposed in the case of virtue habituation. I will briefly review the prior research relevant to *phronesis* in psychology and neuroscience to suggest that biological infrastructure constitutes a basis for *phronesis* cultivation. Then, I will discuss why character embodiment also connects to *phronesis* cultivation based on the entangled *phronesis* concept proposed in recent virtue ethics research.

According to research by virtue ethicists, *phronesis* is deemed a multifaceted functionality consisting of various subcomponents (Darnell et al., 2019, 2022). Although *phronesis*'s primary role is decision-making, it does not exclusively deal with cognitive and reasoning processes but also affective and motivational processes, which are fundamental in moral behavior and flourishing in virtue ethics (Kristjánsson, 2012; Vaccarezza et al., 2023). Based on this assumption, virtue ethicists proposed and examined conceptual models of *phronesis*. I will introduce two mainstream models in the field, i.e., the Jubilee Centre and Aretai Centre models.

First, Darnell et al. (2019, 2022) proposed the Jubilee Centre Model of *phronesis*, which consists of four subcomponents, i.e., blueprinting of flourishing, moral sensitivity, reason-infused emotion, and moral adjudication. As introduced previously, blueprinting is about setting one's goal for flourishing and centralizing moral values and virtues to oneself, like the idea proposed by moral identity. Moral sensitivity enables one to detect potential moral problems and harm to others' welfare by reading the current situation. Reason-infused emotion is about regulating one's emotions appropriately based on reasoning for

long-term emotional well-being. Moral adjudication allows one to make judgments with sophisticated rational capacities for morally ideal behavior. According to the inventors of the model, optimal moral functioning requires appropriate coordination and interaction between the components. Kristjánsson and Fowers (2024) employed the analogy of a professional decathlon athlete to explain how *phronesis* works based on the model. A decathlon player cannot be successful merely by mastering individual sports; instead, the player should be capable of managing and coordinating one's various skill sets appropriately depending on situational factors to win the game eventually. According to Kristjansson and Fowers (2024), such is also the case in *phronesis*.

Second, we may also refer to another mainstream model of *phronesis*, i.e., the Aretai Centre Model, proposed by De Caro et al. (2018), which focuses on ethical expertise as the core aspect of *phronesis*. Although the Aretai model also attempts to explain *phronesis* within the context of optimal moral functioning, it is more interested in *phronesis* as a mastered ethical expertise as a single psychological component managing the exercise of individual virtues. According to their model and prior research on ethical expertise, such expertise requires 1. Representations guiding knowledge application; 2. Sensitive perception of contextual factors; and 3. Mega-cognition and critical deliberation for context-sensitive judgments (Narvaez & Lapsley, 2005). When *phronetic* one masters the required capacities for ethical expertise, one can render the best decisions and behave optimally across situations while employing individual virtues as the knowledge of ground for wisdom (De Caro et al., 2024).

A recent work by Han (2024b) examined the two mainstream *phronesis* models introduced above with evidence from psychology and neuroscience. He proposed that

studies focusing on neural networks engaging in various socio-moral functioning may support integrating both models to explain *phronesis* better. Psychological research on *phronesis* reported that *phronesis* requires various psychological subcomponents related to reasoning, identity, and empathy (Darnell et al., 2022; Han, 2024c). Among them, Han (2024c) showed that the strength of the functional network among the subcomponents significantly predicted moral functioning measured by civic engagement. Network neuroimaging research has demonstrated that within the context of socio-moral cognition, brain circuitries supporting three functional components dealing with socio-moral matters, i.e., the default mode network (related to moral cognition and identity), salience network (related to moral sensitivity and empathy), and central executive network (related to emotional and motivational regulation), are interacting with each other to generate motivation and behavior (Han, 2024b). Based on these, Han (2024b) proposed that the Jubilee Centre Model deals with the multifacetedness of *phronesis* while the Aretai Model explains the necessity of functional networking for expertise.

Experimental neuroimaging studies have reported that training and exercise targeting cognitive functionalities connected with the brain circuitries mentioned above can induce functional and structural changes in them (Gera et al., 2023; Graybiel, 2008; Zwosta et al., 2018). Likewise, the structural and functional aspects of the brain regions involving the networks and circuitries also predict the psychological processes related to *phronesis* (Han, 2024b). These neuroimaging research findings suggest that *phronesis* is inseparable from neural-level infrastructure, and its cultivation engages in the development of cognitive functions at the neural level, like the case of virtue habituation. Again, the Aretai Model proposes that cultivating *phronesis* is mastering ethical expertise to

respond to situations optimally and naturally (De Caro, 2024). Thus, its cultivation and sophistication may require developing the relevant cognitive capacities, which have been proposed and examined by the Jubilee Centre Model (Darnell et al., 2019, 2023).

On top of the engagement of neural-level infrastructure in *phronesis* and its cultivation, we can find the necessity of the involvement of bodily activity in the processes from recent works on entangled *phronesis*. Henderson (2023) proposed entangled *phronesis* to support the possibility of teaching *phronesis* by moral educators, who might not be perfectly virtuous and *phronetic*. Even imperfect moral educators, who are imperfect but more *phronetic* than students, can cultivate *phronesis* among students as proximal and relatable virtue role models via sharing the blueprint of a flourishing life, emulation, and ethical communication (Henderson, 2024b, 2024a). One thing to note is that such cultivation can occur via entanglement with role modeling, which involves concrete actions to emulate the presented exemplary behavior (Han, 2024a). Such an entanglement requires emulating virtuous deeds presented by role models through behavior and action instead of merely being responsive to their messages. Thus, more than simply teaching conceptual and abstract ideas about wisdom, learning by doing and practicing via activities, including bodily emulation of virtues, is needed to promote *phronesis* within the entanglement context. The point is plausible given moral philosophers proposed that *phronesis* is multifaceted (Darnell et al., 2019, 2023), embraces cognitive, affective, motivational, and behavioral components (Kristjánsson et al., 2021), and connects to expertise (De Caro, 2024). See the case of the decathlon athlete analog (Kristjánsson & Fowers, 2024). A decathlon player cannot master the expertise to balance various skills that may conflict with each other without engaging in concrete bodily activities to practice them. These

support the importance of embodiment involving concrete behavior during *phronesis* cultivation.

Evidence from scientific examinations of the basis for moral functioning also corroborates the point. Han (2024d) proposed that *phronesis* cultivation can only effectively occur when concrete exemplars and emulation activities are employed based on findings from neuroimaging and AI studies. He suggested *phronesis* functioning requires appropriate coordination and interaction between brain circuitries involving various cognitive capacities, i.e., the default mode, salience, and central executive networks (Han, 2024b). Thus, presenting concrete examples and engaging in exercises on top of teaching individual skills is required for effective *phronesis* practice. Students should learn how to holistically adjust activities and interactions between networks, like the decathlon training case (Kristjánsson & Fowers, 2024). Given the complexity of the network structure and its mechanism of interactions among subcomponents (Darnell, 2023; Han, 2024a, 2024c), only exemplars implementing virtues and moral excellence can demonstrate how to optimize the functional network for *phronesis* with concrete examples. They, not simple instructions focusing on individual capacities, can only teach adjusting, upregulating, and downregulating the capacities and coordinating their cooperation for optimal decision-making and behavior across different situations (Han, 2024a; 2024b).

We can also refer to recent research on learning by AI researchers to get additional insights about why embodiment matters in *phronesis* cultivation. AI research has consistently supported that example-based learning significantly outperformed rule-based learning, which focuses on individual rules rather than holistic exemplarity (Han, 2024d). For example, in the case of medical decision-making requiring professional expertise and

cognitive skills, AI systems demonstrated significantly better diagnosis accuracy when they learned patterns from concrete examples than individual rules and skill sets (Yamazaki et al., 2023). Recent research on meta-learning, which is about generalizing learning outcomes across different cognitive domains, suggests that input from diverse examples is essential for developing domain-general prediction and learning abilities (Binz et al., 2023; Han, Under review). Moreover, learning by example, not abstract rule, promotes the development of complicated cognitive capacities in AI (FeldmanHall & Lamba, 2023; Pedersen & Johansen, 2020). AI systems adjust their hyperparameters in the neural networks during exemplar-based learning to produce predicted outcomes via learning by doing and trial and error. The discrepancy between the generated predicted outcome and the presented example provides feedback to the systems to readjust parameters to improve model performance.

These updates in the field consistently suggest that learning from and interacting with concrete examples, not unidirectional input of abstract rules and concepts, are fundamental requirements for improving performance in AI systems. Given AI researchers and neuroscientists proposed that research on AI and neural networks provides insights into understanding human cognition and psychological processes (Macpherson et al., 2021), we may assume that learning via concrete exemplars is also fundamental for effective learning among humans. Based on such points, Han (2024d) also proposed that AI research can offer additional evidence supporting the necessity of using concrete exemplars for moral learning and development, particularly those aiming at generalization across situations and motivational and behavioral promotion. Because *phronesis* requires generalizing learned cognitive, affective, motivational, and behavioral capacities in a

complicated functional network for optimal moral functioning across different situations (Han, 2024b, 2024c), evidence from AI can support the need for exemplars in *phronesis* cultivation. Furthermore, the importance of learning by doing and trial and error in the learning process for performance improvement corroborates the necessity of embodiment for *phronesis* cultivation with exemplars (Henderson, 2023).

In this part, I briefly introduced recent research on *phronesis* since virtue ethicists proposed that *phronesis* cultivation features the second phase of virtue development after virtue habituation. The recent works by moral philosophers and psychologists suggest that *phronesis* is a multifaceted construct consisting of various psychological functional components in a network of coordination and interaction (Darnell et al., 2023; Han, 2024b, 2024c). Given the complexity of the interactive network among functional components constituting *phronesis* functioning, moral educators suggested that exemplars holistically implementing virtues and wisdom can provide concrete guidance, so they, not instructions focusing on individual skills, can effectively promote *phronesis* cultivation. Research in AI learning also corroborates the point (Han, 2024d). Simply presenting abstract moral concepts and principles without concrete virtuous exemplary cases cannot effectively cultivate *phronesis*, as shown by the superiority of example-based learning to rule-based learning in AI research. The learning mechanism of AI systems featured by concrete trials to improve performance by using exemplars as sources for model readjustment further substantiates the necessity of embodiment, especially the involvement of concrete actions for learning by trials and errors, in *phronesis* cultivation. Based on these points about *phronesis* cultivation and character embodiment, I will discuss practical aspects about moral and character education and future directions for research.

Educational Implications and Future Directions

From what I overviewed in the previous parts, I proposed that embodiment involving learning by doing, trials and errors, and interaction with exemplars are fundamental in virtue habituation and *phronesis* cultivation. As shown by psychological and AI research, merely offering instructions focusing on individual cognitive capacities for virtues and wisdom without presenting concrete exemplars could not be effective (Han, 2024d, 2024a; Sanderse, 2020). Virtue habituation requires the repeated process of habituation via exercise and practice of exemplary virtuous deeds (Sanderse, 2020), so neuroscientific studies about habituation can substantiate the necessity of embodiment involving bodily activity (Gera et al., 2023; Graybiel, 2008; Zwosta et al., 2018). We also overviewed why using exemplars and considering embodiment are essential for *phronesis* cultivation based on the philosophical and empirical works examining the complicated nature of the functional network for *phronesis* (Han, 2024a, 2024b, 2024c). Based on these, I will discuss the educational and practical implications of the points about embodiment and virtue development mentioned previously in this part.

I will begin a discussion of the educational implications of embodiment and virtue development by considering how to improve the effectiveness of character education based on the points we have addressed in this chapter so far. For a more successful implementation of character education with exemplars and embodiment, I will refer to the SDT for practical insights. According to the SDT, educators should support students' needs for autonomy, competence, and relatedness to facilitate motivational promotion and optimize performance outcomes (Ryan & Deci, 2000). Within the exemplar-applied moral and character education context, Han and Graham (2024) reported that instructions using

exemplars should be designed to support the three needs mentioned above. First, they proposed that instructional methods should be autonomous. For instance, their data syntheses demonstrated that student-originated activities (e.g., promoting exemplars' virtues via paint drawing, letter writing, etc.) more effectively promoted moral motivation than merely presenting exemplary stories. Second, they suggested that moral educators should arrange attainable and relatable exemplars to support the need for competence and relatedness. Related to the interaction between an individual and context, educators need to consider the contextual aspects of moral exemplars and role models particularly for contextually sensitive and effective character development when they are teaching students from socially and historically marginalized backgrounds (Murry et al., 2024; Narvaez, 2010).

Regarding the connectivity between the SDT and embodiment, SDT theorists proposed that appropriate implementations of the SDT in practice require consideration of embodiment. For example, Ryan and Deci (2004) argued that realizing autonomy is inseparable from the involvement of the brain and body and their interaction with the context. In such a process of body-context interaction, it is also necessary to support the need for competence and relatedness for optimal motivational promotion. Based on such assumptions, i.e., the necessity of body and brain involvement in cognitive and motivational processes and the importance of body-context interaction, Russell (2023) suggested that the SDT and the theory of embodied cognition share the same root. Hence, while examining the fundamentality of embodiment within the context of virtue development, the SDT will provide insights into optimizing learning and motivational processes by supporting the three needs while considering those assumptions.

Given the assumptions about embodiment and self-determination, as suggested by Han and Graham (2024), exemplar-applied education should support the need for autonomy, competence, and relatedness. Simultaneously, for more effective virtue habituation and *phronesis* cultivation engaging in mastering ethical expertise, concrete training, and exercise-involving activities are necessary. Sanderse's (2024) argument about self-cultivation via applying exemplars as moral mentors in moral education supports the point. He argued that moral educators employ exemplars to promote self-cultivation of virtues instead of unidirectionally transmitting virtues to students so that they receive them passively. On top of virtue habituation, *phronesis* cultivation also requires self-cultivation. Given that *phronesis* is about having the capacity to render the best decisions across situations with flexibility (Kristjánsson et al., 2021), it is plausible to assume that mere instructions without the involvement of self-cultivation, including self-reflection and deliberation, could not be effective.

Hence, to be ideal, exemplars may need to become moral mentors who can advise students on how to exercise and adjust virtues in concrete situations interactively, not unidirectionally (Han & Graham, 2024; Sanderse, 2024). Such a process should occur in a contextually sensitive manner while carefully considering students' current capacities and backgrounds to support the need for competence and relatedness to maximize effectiveness (Han & Dawson, 2024; Murry et al., 2024). Furthermore, as suggested previously, moral educators should employ concrete exercises of virtues and wisdom in real situations involving actions, which promote the embodiment of virtuous character, instead of mere presentation of exemplarity or unidimensional transmission of ethical expertise. Philosophical accounts on *phronesis* cultivation via entanglement can support the

necessity of concrete activity and embodiment for *phronesis*, which I overviewed previously (Henderson, 2024, 2024a, 2024b). As shown in empirical studies focusing on the behavioral and neural changes involving habituation and those on the SDT, such a direction of moral and character education involving embodiment with exemplars and mentors will be the most effective way for virtue development, including virtue habituation and *phronesis* cultivation.

A significant issue in the prior research on this topic I overviewed is the insufficiency of neuroimaging and embodied cognition studies directly targeting the processes of virtue habituation and *phronesis* cultivation. Most previous neuroimaging and empirical studies I reviewed addressed the exercise or habituation of cognitive and sensorimotor skills (e.g., contemplative or mediation intervention, Baduk playing, etc. [Jung et al., 2013, 2018; Lee et al., 2010]) or the neural correlates of individual moral functioning instead of *phronesis* as a holistic construct. Although some neuroimaging studies (e.g., Han et al., 2016; Jung et al., 2016) investigated neural networks or circuitries associated with morality instead of individual regions, they did not employ tools or measures designed to examine *phronesis* (e.g., Short *Phronesis* Measure [SPM; Kristjansson et al., 2023]). Thus, many of my points about embodiment, virtue habituation, and *phronesis* cultivation might be based on indirect, not direct, scientific evidence. Hence, they might be speculative rather than conclusive. Future empirical studies using more direct measures and approaches for virtue development will address this issue and provide more accurate information about how embodiment is associated with virtue and *phronesis* cultivation.

Concluding Remarks

I discussed the necessity of using exemplars engaging in active embodiment for effective virtue development, i.e., virtue habituation and *phronesis* cultivation. Based on evidence from psychological and neuroscientific studies, I proposed that educators should employ exemplars, particularly those who act as moral mentors to students. Given the considerations of entangled *phronesis* and SDT, moral exemplars and mentors should be used to support students' need for autonomy, competence, and relatedness. During the instructional process, vigorous interaction between exemplars and students with engagement in embodying experiences, such as concrete activities for emulating presented virtues, is expected. As discussed, the concept of character embodiment involving concrete interactions with moral exemplars and mentors arranged with the basis of the SDT will provide moral educators with guidelines about how to design education for virtue and character development. Future empirical studies employing direct measures and experimental paradigms for *phronesis* (e.g., SPM) will further expand our understanding of the mechanism of virtue development involving embodiment.

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